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# THE 2006 INTERNATIONAL PIPING PLOVER CENSUS IN CANADA

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**J. Paul Goossen and Diane L. Amirault-Langlais (editors)**

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# **THE 2006 INTERNATIONAL PIPING PLOVER CENSUS IN CANADA**

**J. Paul Goossen<sup>1</sup>**  
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(editors)

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## Abstract

The fourth International Piping Plover Census was conducted primarily during 3-16 June 2006. The Canadian breeding population is now estimated at 2164 adults, which represents approximately 27% of the North American breeding population. In comparison to the 2001 census, Canadian numbers increased markedly (+49%), however, this figure may be artificially high because the number of birds in Prairie Canada was lower than normal in 2001.

The increase in number of breeding Piping Plovers did not occur in all regions of Canada. Eastern Canada results represent a decrease of -4% (460 adults compared with 481 in 2001). Within the eastern Canadian jurisdictions, the following numbers of adults were counted: 167 in New Brunswick, 95 in Prince Edward Island, 63 in Québec, 87 in Nova Scotia and 48 in insular Newfoundland. Newfoundland experienced an increase (+23%), whereas New Brunswick remained stable and other provinces reported lower numbers in comparison to 2001. The total regional eastern population estimate remains below 1991 levels.

Ontario and Prairie Canada reported 1704 Piping Plovers in 2006, an increase of +75% from the 2001 estimate of 973 adults. The 2006 distribution of birds can be summarized as follows: Saskatchewan 1420, Alberta 274, Manitoba 8 and Ontario 2. Large increases were reported in Alberta (+83%) and Saskatchewan (+76%), however, substantial reductions were reported for Manitoba (-50%). Piping Plover numbers in Ontario remained at very low abundance in this province.

The Prairie population recovery objective of 1626 adults was achieved; however, the time-frame for meeting this target over three consecutive international censuses has not been achieved. The challenge remains for Alberta, Manitoba and Ontario to attain their provincial target even for the first time.

Eight adult Piping Plovers were counted on the French islands of St-Pierre-et-Miquelon. This count represents a slight reduction in the number of individuals since 2001 (eight versus nine adults in 2001, -11%).

Population levels in eastern Canada appear to be subject to peaks and lows, despite consistently strong productivity levels. The cause of these trends are not well understood, however, the high productivity reported may buffer the population from experiencing larger declines than have been reported. The increase in Prairie Piping Plovers since 2001 may have resulted from years of management efforts, particularly in Alberta, even though habitat conditions in 2006 were less favourable than in 2001.

Recovery programs for the Piping Plover have been maintained since the last census with the realization that the species is management-dependent. There is a continued focus on efforts to reduce disturbance, curb predation problems and increase enforcement efforts to reduce illegal off-road vehicle use on nesting beaches.

## Résumé

Le quatrième Recensement international du Pluvier siffleur a eu lieu principalement du 3 au 16 juin 2006. Au Canada, la population d'oiseaux nicheurs est présentement estimée à 2 164 adultes, ce qui représente environ 27 % de la population d'oiseaux nicheurs en Amérique du Nord. Comparativement au recensement de 2001, il s'agit là d'une forte augmentation (+49 %), mais ce chiffre pourrait être artificiellement élevé parce que le nombre d'oiseaux dans les Prairies au Canada était inférieur à la normale en 2001.

Le nombre de Pluviers siffleurs reproducteurs n'a pas augmenté dans toutes les régions du Canada. Dans l'Est, le nombre d'adultes représente une baisse de -4 % (460 adultes comparé à 481 en 2001). Dans les provinces de l'Est, les adultes dénombrés étaient de : 167 individus au Nouveau-Brunswick, 95 à l'Île-du-Prince-Édouard, 63 au Québec, 87 en Nouvelle-Écosse et 48 dans la partie insulaire de Terre-Neuve. Les populations ont augmenté à Terre-Neuve (+23 %) et ont demeuré stable au Nouveau-Brunswick, mais ont baissé dans les autres provinces par rapport à 2001. La population régionale totale estimée dans l'Est du Canada est inférieure à la population recensée en 1991.

En Ontario et dans les provinces des Prairies, on a recensé 1 704 Pluviers siffleurs, ce qui est une augmentation de +75 % par rapport à l'estimation de 973 adultes en 2001. La distribution des oiseaux en 2006 peut être résumée comme suit : Saskatchewan 1 420, Alberta 274, Manitoba 8 et Ontario 2. On a observé de fortes augmentations en Alberta (+83 %) et en Saskatchewan (+76 %), mais une baisse importante au Manitoba (-50 %). En Ontario, le nombre de Pluviers siffleurs est resté plus ou moins pareil et très faible.

L'objectif de 1 626 adultes pour le rétablissement de la population dans les Prairies a été atteint; cependant, le délai prescrit pour l'atteindre dans l'espace de trois recensements internationaux consécutifs n'a pas été atteint. L'Alberta, le Manitoba et l'Ontario doivent relever le défi d'atteindre leur objectif provincial pour une première fois.

Huit Pluviers siffleurs adultes ont été dénombrés aux îles St-Pierre-et-Miquelon. Cet effectif représente une réduction légère au nombre d'individu depuis 2001 (huit versus neuf adultes en 2001, -11%).

Dans l'Est du Canada, les populations semblent aller par monts et par vaux, malgré des taux de reproduction régulièrement élevés. La cause de ces tendances n'est pas bien connue, mais la forte reproduction signalée pourrait protéger la population contre des baisses plus fortes que celles signalées jusqu'ici. Dans les provinces des Prairies, l'augmentation de la population de Pluviers siffleurs depuis 2001 pourrait être le résultat de plusieurs années d'efforts de gestion, particulièrement en Alberta, même si en 2006 les conditions de l'habitat étaient moins favorables qu'en 2001.

Les programmes de rétablissement des populations du Pluvier siffleur ont été maintenus depuis le dernier recensement parce que l'on s'est rendu compte que la survie de l'espèce dépend des programmes de gestion. On vise à réduire les perturbations, à résoudre les problèmes de prédation et à renforcer l'application de la loi pour réduire l'utilisation illégale de véhicules hors route sur les plages de nidification.

## Acknowledgements

Our thanks are extended to the provincial census coordinators for their significant contribution to the successful completion of the 2006 International Piping Plover Census. Specifically, we would like to thank the following individuals: Ken De Smet, Paul Harris, Leo Heyens, Paule Hjertaas, Tracy MacDonald, Julie McKnight, Ken Porteous, David Prescott, Isabelle Schmelzer, François Shaffer, Margaret Skeel, Jennifer Stewart, and Neil Sylvestre. Authors of the provincial summaries provided us with their respective input in a timely fashion, permitting the tabulation of national results within an unprecedented time frame.

We would also like to highlight the invaluable contributions of the many census participants, without whom the completion of the 2006 International Piping Plover Census would not have been possible. The many individuals, who are identified within provincial chapters, have shown exemplary dedication, professionalism and attention

to detail in conducting the census. The commitment demonstrated in participating in the census counts and the ongoing conservation efforts are the cornerstone of the national recovery programs. Your efforts are kindly acknowledged.

Thanks are extended to the North American census coordinator, Elise Elliott-Smith, for her dedication and organizational talents in ensuring timely distribution of materials required to complete the census. We also thank Sue Haig who initiated the concept of international censuses for the Piping Plover and for her continued commitment to these counts. Jennifer Stewart and Marie-France Noel provided invaluable assistance in formatting this report.

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## Table of Contents

Abstract .....	iii
Résumé .....	iv
Acknowledgements .....	v

Introduction to the 2006 International Piping Plover Census <i>D.L. Amirault-Langlais</i> .....	1
--	---

## EASTERN CANADA

The 2006 Piping Plover Census in Newfoundland and Labrador and St- Pierre-et- Miquelon (France) <i>P. Harris and R. Etcheberry</i> .....	4
The 2006 Piping Plover Census in Nova Scotia <i>J. McKnight</i> .....	20
The 2006 Piping Plover Census in Prince Edward Island <i>T. MacDonald</i> .....	36
The 2006 Piping Plover Census in New Brunswick <i>J.I. Stewart</i> .....	51
Recensement international du Pluvier siffleur au Québec, en 2006 <i>F. Shaffer</i> .....	70

## ONTARIO

The 2006 Piping Plover Census in Ontario <i>L.E. Heyens</i> .....	78
--	----

## PRAIRIE PROVINCES

The 2006 Piping Plover Census in Manitoba <i>N. Sylvestre and Ken De Smet</i> .....	85
--	----

**TABLE OF CONTENTS (CONT'D)**

The 2006 Piping Plover Census in Saskatchewan <i>P. Hjertaas</i> .....	94
The 2006 Piping Plover Census in Alberta <i>D.R.C. Prescott, S.D. Stevens, R. Schmelzeisen and L. Engley</i> .....	111
 <b>Piping Plover Conservation in Canada (2001-2006)</b> <i>J.P. Goossen, D.L. Amirault-Langlais, E. Elliott-Smith and S.M. Haig</i> .....	 124
 <b>Literature Cited</b> .....	 133
 <b>Appendix 1</b> Census methodology and forms .....	 141

## **Introduction to the 2006 International Piping Plover Census**

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### **The International Piping Plover Census in Perspective**

With the successful implementation of the 2006 International Piping Plover Census, five-year population indices are now available for the entire North American breeding population for four "snapshots" since 1991. As each subsequent five-year survey is completed, the wealth of population information grows, providing insights into long-term population trends, patterns of abundance and distributional changes. The information gained through these surveys is important for several reasons and some of these may be more relevant for parts of the species range. For some regions of North America, particularly in the Northern Great Plains, a consistent range-wide survey provides the impetus for undertaking ambitious efforts to establish abundance which may not be feasible on an annual basis because of the extent of suitable habitat that must be surveyed. For regions where annual "window counts" have become routine outside international census years, the range-wide surveys allow recovery managers a method of evaluating their region's population estimates and trends in comparison to others. For all populations, there is considerable value in pooling together data collected consistently among recovery units to estimate the global abundance of the species, evaluate progress made towards recovery of the species and identify issues of conservation concern that span several if not all population units.

Methodology and timing of the 2006 international census effort has remained fairly consistent with previous census efforts in order to facilitate comparisons among censuses. This has undoubtedly also helped to achieve increased competency of individuals involved in the census, many of which have participated in multiple census efforts. Despite the high level of competency of individuals involved in completing field surveys, concerns have been raised related to the potential inaccuracy of counts because of the cryptic nature of the species. The concern relates specifically to the accuracy of estimating population abundance based on only one count within a nesting season, considering that the potential of overlooking pairs and individuals exists. Double-counting may also be an issue in conducting a census in expansive wetland habitats. A new feature was therefore added

to the 2006 International Piping Plover Breeding Census in order to determine to what extent Piping Plovers may be overlooked or double-counted when only a single census count is undertaken within a defined window. This "detectability study" was implemented at randomly selected sites and involved completing two independent surveys, both within the census window. Objectives of the detectability study were to determine whether the counts obtained between the two visits differed and, if so, whether a correction index could be calculated. This would ideally enable an assessment of the degree of accuracy of census efforts.

### **Conservation Efforts**

Piping Plovers continue to face important threats to their survival across the breeding range. Many of the challenges faced by plovers are not new, and agencies across North America strive to develop new and innovative techniques to address threats with the hope of achieving real and sustained progress towards recovery of the species. Predation, human disturbance and incompatible land management practices continue to be the major factors compromising recovery of the species. Despite the considerable challenge in affecting species recovery, the two Canadian recovery teams and their partners continue to implement ambitious conservation programs for the two subspecies.

Within eastern Canada, the Piping Plover Guardian Program continues to have a strong presence in each provincial jurisdiction, ensuring that on-the-ground programs are implemented according to an over-arching regional approach. Successes are being made in the region with high productivity rates being recorded in most provinces in typical nesting seasons. In addition to the educational, conservation and monitoring efforts of guardians, research has played an important role in better understanding regional population dynamics. Research projects completed since the last international census included: a long-term banding study completed in 2003 (Amirault et al. 2006; Calvert et al. 2006) and several graduate research studies related to habitat characteristics (Stewart 2004); impacts of human disturbance on productivity (Murphy 2007); and evaluating habitat carrying capacity (Goodale 2006). Pressing research and conservation needs remain, and are related to increasing protection of the wintering grounds and determining genetic affinities within the regional population and with other parts of the species range.

One of the biggest challenges facing conservation efforts in the Prairie Provinces is how to effectively manage Piping Plovers given the broad geographic area within its western range. Alberta has been very successful in working with its Piping Plover population. About 75% of the population is managed annually through use of predator exclosures (L. Engley, pers. comm.). In 2006, about 83% of the prairie population was found in Saskatchewan; however, annual conservation efforts to increase productivity through predator exclosures are limited to about 14% of the province's plover



population. This effort is limited to Lake Diefenbaker and is primarily a mitigative measure to sustain or increase plover productivity affected directly or indirectly by reservoir water levels. In 2006, all of Manitoba's known Piping Plover population (8) was under intensive management within the confines of Grand Beach Provincial Park. At Lake of the Woods, Ontario, Piping Plovers continue to exist at the edge of extirpation with only one bird seen during the census in 2006. As of 2006, Piping Plover guardianship programming in Alberta, Saskatchewan and Manitoba provided educational and conservation support in areas where the potential for human disturbance was high.

Results of the 2006 International Piping Plover Breeding Census are summarized within this report by federal coordinators, provincial jurisdictions or their cooperators, and include overviews of ongoing recovery efforts and continuing challenges. The ultimate objective of the report is to provide a synopsis of the results, compare these to previous surveys in order to document the current status of the species in Canada and in relation to neighboring populations. Research needs are identified in light of recovery and conservation of the species.



## **The 2006 Piping Plover Census in Newfoundland and Labrador and St- Pierre-et-Miquelon (France)**

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### **Abstract**

The 2006 International Piping Plover Census in Newfoundland was carried out from 3-16 June. A total of 76 sites were surveyed in insular Newfoundland and the French islands of St-Pierre-et-Miquelon, representing an increase of +33 sites (+29.5 km) from the 2001 census. Five sites were included as part of the detectability study. In total, 56 Piping Plovers were observed within the census window at 15 sites (48 birds at 12 sites in Newfoundland and 8 birds at two sites on St-Pierre-et-Miquelon). These numbers represent an overall increase of eight adults from 2001: an increase of nine adults in Newfoundland and a decrease of one adult in St-Pierre-et-Miquelon. A total of 32 individuals completed the census.

The final end of year total of Piping Plovers in Newfoundland for 2006 was 26 pairs and 3 single birds for a total of 55 adults. Forty seven chicks fledged from 23 pairs monitored for an average productivity of 2.04 chicks fledged per pair. The eight adults observed on St-Pierre-et-Miquelon consisted of four pairs, all attending nests; however productivity was not determined for these pairs.

Over the past three censuses a small increase has been observed in the population of Piping Plovers in Newfoundland and distribution has also expanded. During the 1991 census, birds were only found on the south coast at Big Barasway Wildlife Reserve while the 1996 census showed them occurring at beaches in the southwest corner of the province. Today, the Newfoundland range continues to grow in the southwest corner of the province and its distribution has grown on the south coast in Burgeo and Fortune Bay.

### **Résumé**

Le recensement international des Pluviers siffleurs de 2006 a été effectué du 3 au 16 juin. Au total, 76 sites de la partie insulaire de Terre-Neuve et des îles françaises de Saint-Pierre et

Miquelon ont été étudiés, ce qui représente une augmentation de +33 sites (un élargissement de la région de +29,5 km) par rapport au recensement de 2001. Cinq sites ont fait partie de l'étude sur la détectabilité. Pendant la période fixée par le recensement, on a observé un total 56 Pluviers siffleurs à 15 sites (48 oiseaux à 12 sites à Terre-Neuve et huit oiseaux à deux sites à Saint-Pierre et Miquelon). Ces chiffres représentent une augmentation générale de huit adultes depuis 2001 : une augmentation de neuf adultes à Terre-Neuve et une diminution d'un adulte à Saint-Pierre et Miquelon. En tout, 32 personnes ont participé au recensement.

Pour toute l'année 2006, le nombre définitif de Pluviers siffleurs à Terre-Neuve était de 55 adultes, à savoir 26 couples et trois individus. On a suivi 47 oisillons qui ont atteint l'âge de l'envol pour 23 couples, ce qui représente une productivité moyenne de 2,04 oisillons par couple. Les huit adultes observés à Saint-Pierre et Miquelon constituaient quatre couples qui fréquentaient tous le nid. La productivité de ces couples n'a toutefois pas été déterminée.

Au cours des trois derniers recensements, on a observé une légère augmentation de la population de Pluviers siffleurs dans la province et leur répartition géographique s'est également accrue. Au cours du recensement de 1991, les oiseaux n'ont été observés que sur la côte sud de la réserve de faune Big Barasway, tandis qu'au cours du recensement de 1996, ils ont été observés sur les plages au sud-ouest de la province. Aujourd'hui, la population terre-neuvienne continue de croître dans le sud-ouest de la province et leur répartition géographique s'est élargie vers la côte sud de Burgeo et de Fortune Bay.

### **Introduction**

Surveys for Piping Plovers in Newfoundland and Labrador did not occur before the 1980s. In 1983, the province of Newfoundland and Labrador began conducting annual surveys in some regions, expanding these as knowledge was gained on plover distribution. That year, two sites on the northeast coast and one on the southwest coast were surveyed. By 1988, surveys had expanded to five sites, including Big Barasway Wildlife Reserve, which contained more birds than had been seen at all other sites combined in previous years. Collectively, these surveys suggested that Piping Plovers have never been numerous in the province.

Based on census reports from 1991, 1996, 2001 and other logged historical data, the breeding range in Newfoundland was restricted to a small number of sites on the southwest and northeast coasts. Today, the Piping Plover is found on several beaches throughout the southwestern corner of insular Newfoundland, extending from Grand Bay West to J.T. Cheeseman Provincial Park, Codroy Valley, Flat Bay/Sandy Point to Stephenville Crossing, and Big Barasway - Burgeo to Sandbanks Provincial Park to Big Barasway - Seal Cove, Fortune Bay on the south coast. Piping

Plovers have been absent from the northeast coast since 1987, although the habitat remains largely unchanged (I. Schmelzer, pers. comm.).

St-Pierre-et-Miquelon has been known to host a small breeding population of Piping Plovers since the mid 1980s. All nesting to date has occurred on the island of Miquelon. The population there remains small and therefore extremely vulnerable to extirpation.

The Piping Plover in Newfoundland and St-Pierre-et-Miquelon faces many threats to its survival, including irresponsible All Terrain Vehicle (ATV) use in nesting areas, human disturbance, depredation and habitat loss. Education is always the first step for instilling a sense of stewardship and proper etiquette in Piping Plover habitat. The Piping Plover guardian program in Newfoundland is delivered by the Marine and Mountain Zone Corporation with assistance from the Canadian Wildlife Service and the Newfoundland and Labrador Department of Environment and Conservation. The goals of the program are to: raise awareness about the Piping Plover in areas where these birds breed; instill and encourage responsible stewardship and use of nesting areas; and monitor breeding success to determine annual productivity. The guardian program has proved to be an invaluable conservation initiative and must continue for the overall protection and conservation of the Piping Plover.

The 2006 international census provided an opportunity to assess the current population status in comparison with the other three census efforts. This report summarizes the effort and results of the census within insular Newfoundland and St-Pierre-et-Miquelon and reports on nesting productivity estimated in 2006. The status of conservation efforts in Newfoundland is also summarized.

### Methods

The 2006 census in Newfoundland was coordinated by Paul Harris of the Canadian Wildlife Service and Isabelle Schmelzer of the Newfoundland and Labrador Department of Environment and Conservation. Roger Etcheberry coordinated the census in St-Pierre-et-Miquelon.

Newfoundland was divided into six regions in which known or potentially suitable habitat occurred. A coordinator (an individual with previous regional survey experience) was assigned to each region. Each coordinator was provided with a list of beaches historically surveyed within their region and was responsible for identifying other prospective sites based on their familiarity with plover habitat requirements and the physical characteristics of their region. This way, sites that had known suitable habitat or were believed to have suitable habitat were added to the census list.

From June 3 to 16, 76 sites were surveyed in Newfoundland and St-Pierre-et-Miquelon: 73 sites in Newfoundland and three sites on St-Pierre-et-Miquelon. All sites surveyed during the 1991,

1996 and 2001 censuses were covered in 2006 with the exception of Dune de Miquelon (St-Pierre-et-Miquelon), which has never had plovers. In Newfoundland, 29 participants surveyed 103.9 km of coastline by foot with one to five persons per survey (Figure 1; Table 1). In St-Pierre-et-Miquelon, three individuals surveyed 17 km of coastline (Figure 1; Table 1). Incidental observations were provided by other individuals to supplement information collected through the census. All surveys were completed during favorable weather conditions and data was collected as needed to complete the 2006 international census form.

Individuals participating in the census included staff from the Newfoundland and Labrador Departments of Environment and Conservation and Natural Resources, Marine and Mountain Zone Corporation, Parks Canada Agency, the Canadian Wildlife Service and non-affiliated volunteers. At least one experienced surveyor was present during each beach census. The census of St-Pierre-et-Miquelon was conducted by three non-affiliated volunteers.

Five Newfoundland sites were randomly selected by the United States Geological Survey, to be included in a detectability study. These sites were requested to be surveyed twice within the census period.

In addition to census efforts, monitoring to determine productivity was also conducted in Newfoundland. This year, 23 pairs were monitored throughout the breeding season on 13 nesting beaches.

### Results

In Newfoundland, 48 adult Piping Plovers (16 pairs and 16 singles) were observed on 12 of the 73 beaches surveyed. This is an increase from 39 adults in 2001 and 27 in 1996. More linear habitat was surveyed for Piping Plovers during this census in Newfoundland than ever before. In 2001, 71.4 km of beach was surveyed as opposed to 103.9 km in 2006. Most areas surveyed had good potential habitat, however, some areas had deteriorated or were altered due to erosion and local land use practices to the point where they are no longer suitable for Piping Plover breeding. These areas may not be surveyed for the 2011 international census unless beach changes occur that improve potential habitat for Piping Plovers.

Five of the 76 sites were randomly selected as part of the detectability study. These were all Newfoundland beaches: Sandy Cove, Grand Beach, Lumsden Head West, Sandy Point and Flat Bay. Lumsden Head West, Sandy Point and Flat Bay, were surveyed twice, with no Piping Plovers observed during either survey. Sandy Cove and Grand Beach were not surveyed the second time since habitat was poor to marginal.

In St-Pierre-et-Miquelon, eight adult Piping Plovers (four pairs) were observed on two of the three beaches surveyed. Dune de Miquelon was not surveyed during the census window due to the absence of suitable habitat. The eight adults were observed as pairs attending nest sites. Adults were observed at Gully of Grand Barachois (including the southern part of the Isthme de Langlade) and northeast of the Gully of Grand Barachois. Less linear habitat was surveyed on St-Pierre-et-Miquelon in 2006 than in 2001 (17 km in 2006 versus 20 km in 2001), however all suitable habitat was censused. The results of the census represent a slight decrease (-1 adult) since 2001, when nine adults were counted. Prior to 2006, the Piping Plover population of St-Pierre-et-Miquelon had been experiencing steady increases. Four birds were observed in 1991, six in 1996, nine in 2001 and eight in 2006.

### Discussion

The number of Piping Plovers reported for insular Newfoundland in 2006 (48 adults) was the highest census count ever recorded. Piping Plover numbers have continually increased in the province from seven observed during the 1991 census, to 27 in 1996, and 39 in 2001. Survey effort and efficiency have increased over the years, however it is also important to note that the distribution of Piping Plovers in Newfoundland has grown slightly and now includes new areas on the south coast. New beaches confirmed to be used by nesting plovers in recent years are: Big Barasway – Seal Cove and beaches within Sandbanks Provincial Park, all located on the south coast. Successful nesting attempts were recorded this year at Second, Third and Fourth beaches in Sandbanks Provincial Park and Big Barasway – Seal Cove.

The census results differ from the total annual count of adults recorded in insular Newfoundland. A total of 55 adults were recorded, including 26 pairs and three singles observed on 13 beaches. This is an increase from the 50 adults observed in 2005.

The key areas for Piping Plovers in the province still appear to be Grand Bay West, J.T. Cheeseman Provincial Park and Big Barasway Wildlife Reserve. These three areas had 18 pairs and three singles of the total provincial population, fledging 41 of the total 47 fledged chicks. These areas had more plovers than in 2005, when 17 pairs and five singles were counted. Historically, Piping Plovers in the province were also found on the northeast coast, however, none have been observed in this area since the 1980s. Although the habitat in this area remains suitable for breeding, it experiences a significant amount of human disturbance.

The relatively small Piping Plover population on the French island of Miquelon has increased slightly since the initiation of the international censuses, although a slight decrease was reported between 2001 and 2006 (-1 adult). The key areas for Piping Plovers on Miquelon have been



Gully of Grand Barachois (including the southern part of the Isthme de Langlade), west side of Isthme de Langlade and northeast of the Gully of Grand Barachois. The west side of the Isthme de Langlade was abandoned in 2006 although the habitat remains suitable. Adults at Gully of Grand Barachois face many threats from human activities and predators each year, whereas the northeast Gully of Grand Barachois experiences very little disturbance.

Productivity varies annually with influences such as weather, flooding, disturbance and depredation. In 2005, the overall productivity for insular Newfoundland (2.42 chicks fledged per pair) was the highest among provincial populations in eastern Canada. Overall regional productivity for 2006 was calculated as 1.82 (Amirault and Stewart 2006), therefore productivity in the province (2.04 chicks fledged per pair, Table 2) is slightly above this level. Provincial productivity therefore decreased between 2005 and 2006; however it is still above the minimum 1.65 chicks per pair productivity target that has been calculated to maintain the population at its current level (Calvert 2004).

Nesting Piping Plovers continue to face many threats each year. These threats are mostly related to human disturbance: ATV use, walking unleashed dogs, leaving behind garbage that attracts predators, and other beach-related activities. The Piping Plover guardian program coordinated by the Marine and Mountain Zone Corporation in Newfoundland is working to address this problem. The main focus of the guardian program is to educate and create awareness among beach users in Piping Plover habitat. To do this, guardians use various educational brochures, signage and school presentations to inform people about the Piping Plover and what they can do to help the species. Guardians encourage beach users to use ATVs responsibly, since they are a significant form of human disturbance. Guardians are trained by the Canadian Wildlife Service and the Marine and Mountain Zone Piping Plover Coordinator. Training involves a PowerPoint presentation, beach visit and a newly developed Piping Plover guardian program training video. This video was developed by the Canadian Wildlife Service with the assistance of other organizations in Atlantic Canada. The video is intended for new guardians or a refresher for current guardians prior to the field season. The guardian program in Newfoundland is a necessary tool for ensuring the conservation of the Piping Plover in order to meet recovery goals.

A few years ago, the Provincial Department of Environment and Conservation, Parks and Natural Areas Division had hoped to establish an ecological reserve encompassing the Grand Bay West Region to provide added protection for the population of Piping Plovers in this area. This initiative was unsuccessful. The Rocky Barachois Pioneer Preservers, a local group in the Port aux Basques area established themselves in response to the proposed ecological reserve. Their goal was to promote responsible ATV use in the area using signs and general public conservation. This group

has since disbanded, however, before the group dissolved an initiative was put forward to establish an ATV trail routed away from nesting plovers thereby reducing ATV disturbance. There has been no further action on this proposal.

Other initiatives have also contributed to conservation of the species, including projects aimed at increasing knowledge regarding the species or its habitat. Such projects include the development of a brochure entitled "Piping Plovers in the Codroy Valley need our help". This pamphlet was developed by Intervale, an organization in Codroy Valley interested in community based conservation projects, included local messaging aimed at residents of the Codroy Valley. In 2003, a Canadian Wildlife Service initiative was implemented to provide training for Provincial Park staff in Piping Plover behaviour, some aspects of the *Species at Risk Act*, note taking and reporting endangered species related offences. In 2004, Patricia Cousins, a Science Horizons Intern completed a research project aimed at identifying and monitoring factors that may influence productivity (Cousins 2004). These factors included determining food availability and identifying predators of eggs, chicks or adults.

A new initiative aimed at improving the information base on known and potential Piping Plover beaches was launched in 2006. Regional census coordinators were asked to geographically reference the start, middle, and end points of each beach surveyed during the census. Several photographs documenting the range of habitats (substrate, beach width, exposure to surf) found on each beach were also taken. This information was used to create a geo-referenced photo archive of all surveyed beaches and will be used to document change in habitat quality over time. Currently, this information is being used to review and amend the list of known and potential Piping Plover beaches in Newfoundland.

### Acknowledgements

We would like to thank the many participants that assisted with the 2006 International Piping Plover Census in Newfoundland and Labrador and St. Pierre et Miquelon: Tim Andrews, Eugene Ball, Mike Balsom, Rebecca Dodd, Joe Furlong, Jeri Graham, Lori Hann, Wesley Harris, Lorne Hiscock, Lorna Lafosse, Russ Lomond, Derrick Mercer, Kirsten Miller, Tina Newbury, Lindsay Penney, Michael Runzynski, Clarence Senior, Terry Shea, Eugene Sheppard, Eric Watton, Danny White, and Perry Young. We are most appreciative of the efforts of the regional coordinators: Burgeo and Area- Isabelle Schmelzer (Newfoundland and Labrador Department of Environment and Conservation); Gros Morne and the Northern Peninsula- Randy Thompson (Parks Canada Agency); Grand Bay West and the Codroy Valley- Patricia Cousins (Marine and Mountain Zone Corporation);

northeast coast and Burin Peninsula- Shawn Avery (Newfoundland and Labrador Department of Natural Resources); St. Georges/Stephenville and the Port aux Port Peninsula- Mike Bennett and Leah Soper (Newfoundland and Labrador Department of Natural Resources); Avalon and Fortune Bay – Paul Harris (Canadian Wildlife Service).

In St-Pierre-et-Miquelon, Laurent Jackman and Danielle Lebollocq provided assistance in completing the census. Patrick Boez and Bruno Letournel also provided information on the status of Piping Plovers on Miquelon after the census window.



# 2006 Piping Plover Census

Table 1. Results of the 2006 International Piping Plover Breeding Census in Newfoundland and St. Pierre et Miquelon (France).

Map no.	Site name	Location	1:50,000 NTS <sup>1</sup> map sheet	Date	2006 census					1991 census	1996 census	2001 census
					No. of pairs	No. of adults	No. of observers	Distance surveyed (km)	No. of hours			
5	Banting Memorial Park	Newfoundland	2 F/5	14 June	0	0	3	1.6	1	-	-	-
48	Beck Bay	Newfoundland	11 P/8	4 June	0	0	1	1	0.75	-	-	-
17	Bellevue Beach	Newfoundland	1 N/12	9 June	0	0	1	3.5	2	-	-	-
64	Big Barachois Beach <sup>2</sup>	Newfoundland	11 O/11	16 June	0	0	1	0.5	0.33	-	3	2
54	Big Barasway – Burgeo	Newfoundland	11 P/12	8 June	3	9	3	7.3	7.25	7	5	3
46	Big Barasway - Seal Cove	Newfoundland	11 P/8	4 June	0	1	1	1.3	1.25	-	-	0
24	Big Seal Cove - Ship Harbour	Newfoundland	1 N/5	15 June	0	0	1	0.3	0.25	-	-	-
42	Black Island Cove	Newfoundland	1 M/5	7 June	0	0	2	0.25	0.17	-	-	-
60	Bottle's Barachois (Rocky Barachois Beach)	Newfoundland	11 O/11	7 June	0	3	2	1	1.25	-	1	5
37	Boxey Harbour	Newfoundland	1 M/5	6 June	0	0	1	0.25	0.67	-	-	-
15	"Cape Freels 1"	Newfoundland	2 F/4, 2 F/3	16 June	0	0	4	1.78	0.83	-	0	0
16	"Cape Freels 2"	Newfoundland	2 F/4, 2 F/3	16 June	0	0	4	2.16	1	-	0	0
14	"Cape Freels 3"	Newfoundland	2 F/5, 2 F/6	16 June	0	0	3	0.68	0.33	0	0	0
13	"Cape Freels 4"	Newfoundland	2 F/5, 2 F/6	16 June	0	0	3	0.865	0.83	0	0	0
63	Cape Ray Beach, J.T. Cheeseman Provincial Park	Newfoundland	11 O/11	13 June	2	6	2	2.75	2	-	10	5
40	Chappie Cove	Newfoundland	1 M/5	7 June	0	0	2	1	0.33	-	-	-

Table 1 (cont'd). Results of the 2006 International Piping Plover Breeding Census in Newfoundland and St. Pierre et Miquelon (France).

Map no.	Site name	Location	1:50,000 NTS <sup>1</sup> map sheet	Date	2006					1991 census	1996 census	2001 census
					No. of pairs	No. of adults	No. of observers	Distance surveyed (km)	No. of hours			
57	Connoire Bay North West Arm Sand Bar	Newfoundland	11 P/12	3 June	0	0	4	0.75	0.25	-	0	-
55	Cowlest Beach	Newfoundland	11 P/12	3 June	0	0	4	0.36	0.16	-	-	-
53	Crow Head Beach (ended at Charlie Head)	Newfoundland	11 P/12	3 June	0	0	4	0.8	0.25	-	-	-
7	Deadman's Bay	Newfoundland	2 F/5	16 June	0	0	4	3.1	2	0	0	0
39	E of Coomb's Cove	Newfoundland	1 M/5	6 June	0	0	1	0.5	0.5	-	-	-
44	Eastern Cove - Dog Cove	Newfoundland	1 M/5	4 June	0	0	2	0.48	0.25	-	-	-
52	First Beach - Sandbanks Provincial Park	Newfoundland	11 P/12	4 June	0	0	4	0.46	0.5	-	-	-
59	First Beach - Grand Bay West	Newfoundland	11 O/11	7 June	0	0	2	0.5	0.15	-	-	0
68	Flat Bay Peninsula <sup>1</sup>	Newfoundland	12 B/10	7 June, 13 June	0, 0	0, 0	2, 2	7.8	2.3, 3	-	-	7
51	Fourth Beach - Sandbanks Provincial Park	Newfoundland	11 P/12	4 June	1	4	4	1.2	0.75	-	-	-
73	Fox Island River	Newfoundland	12 B/10	16 June	0	0	1	1.3	0.5	-	-	0
32	"Frenchman's Cove 3 (White Point)"	Newfoundland	1 M/3	6 June	0	0	2	1.71	1.16	-	-	0
34	Frenchman's Cove E	Newfoundland	1 M/3	5 June	0	0	4	2.51	1	-	-	0

Table 1 (cont'd). Results of the 2006 International Piping Plover Breeding Census in Newfoundland and St. Pierre et Miquelon (France).

Map no.	Site name	Location	1:50,000 NTS <sup>1</sup> map sheet	Date	2006					1991 census	1996 census	2001 census
					No. of pairs	No. of adults	No. of observers	Distance surveyed (km)	No. of hours			
33	Frenchman's Cove W	Newfoundland	1 M/3	6 June	0	0	4	2.3	0.83	-	-	0
35	Garnish	Newfoundland	1 M/3	6 June	0	0	4	1.22	0.5	-	-	0
19	Gooseberry Cove	Newfoundland	1 M/1	15 June	0	0	1	0.2	0.17	-	-	-
31	Grand Beach <sup>2</sup>	Newfoundland	1 M/3, 1 M/4	6 June	0	0	4	3.69	3	-	-	0
20	Great Barasway	Newfoundland	1 M/1	14 June	0	0	1	1	0.83	-	-	-
21	Green Point	Newfoundland	1 M/1	15 June	0	0	1	0.6	0.5	-	-	-
30	L'anse au Loup	Newfoundland	1 M/4	6 June	0	0	4	2.26	1.75	-	-	0
26	Lansy Bank Cove	Newfoundland	1 L/13	7 June	0	0	2	0.18	0.5	-	-	-
45	Little Barasway	Newfoundland	11 P/8	4 June	0	0	2	0.88	0.5	-	-	-
65	Little Codroy Beach (MacDougal's) and St. Andrew's Gut	Newfoundland	11 O/14	15 June	2	4	2	2	1.83	0	0	4
25	Little Lawn	Newfoundland	1 L/4	7 June	0	0	5	0.625	0.67	-	-	-
11	Lumsden	Newfoundland	2 F/5	14 June	0	0	3	0.96	1	0	-	-
9	Lumsden Head E	Newfoundland	2 F/5	14 June	0	0	3	1.75	1	0	0	0
10	Lumsden Head W <sup>2</sup>	Newfoundland	2 F/5	13 June, 16 June	0, 0	0, 0	3, 4	1.84	0.75, 1.67	0	0	0
67	Millville Beach, Grand Codroy Provincial Park	Newfoundland	11 O/14	15 June	0	0	2		0.75	0	2	0
4	Musgrave Harbour	Newfoundland	2 F/5	14 June	0	0		3.88	1.67	0	0	0
62	Osmond Beach	Newfoundland	11 O/11	14 June	1	3	2	0.4	0.5	-	0	2
43	Partridge Cove	Newfoundland	1 M	5 June	0	0	1	0.5	0.5	-	-	-
8	Pennybeck	Newfoundland	2 F/5	16 June	0	0	1	1.06	0.58	-	-	-
29	Point au Gaul	Newfoundland	1 L/13	7 June	0	0	4	2.4	1.25	-	-	-

# 2006 Piping Plover Census

Table 1 (cont'd). Results of the 2006 International Piping Plover Breeding Census in Newfoundland and St. Pierre et Miquelon (France).

Map no.	Site name	Location	1:50,000 NTS <sup>1</sup> map sheet	Date	2006					1991 census	1996 census	2001 census
					No. of pairs	No. of adults	No. of observers	Distance surveyed (km)	No. of hours			
72	Point Au Mal	Newfoundland	12 B/10	16 June	0	0	1	2.5	1.5	-	-	0
18	Point Lance Beach	Newfoundland	1 L/16	14 June	0	0	1	1.3	1	-	-	-
22	Point Verde	Newfoundland	1 M/1	14 June	0	0	1	0.4	0.25	-	-	-
3	Portland Creek	Newfoundland	12 I/04	13 June	0	0	2	2.3	1.25	-	-	-
47	Saltwater Cove	Newfoundland	11 P/8	8 June	0	0	1	0.2	0.33	-	-	-
38	Saltwater Cove - St. John's Bay	Newfoundland	1 M/5	6 June	0	0	1	0.75	0.5	-	-	-
27	Sandy Cove <sup>3</sup>	Newfoundland	1 L/13	7 June	0	0	5	0.5	0.83	-	-	-
69	Sandy Point, Flat Island <sup>3</sup>	Newfoundland	12 B/10	6 June, 13 June	0, 0	0, 0	2, 2	2	2.5, 1.75	0	2	3
66	Searston Beach	Newfoundland	11 O/14	15 June	0	0	2	0.5	0.15	-	0	2
50	Second Beach - Sandbanks Provincial Park	Newfoundland	11 P/12	4 June	1	4	4	0.7	0.75	-	-	-
58	Second Beach, Grand Bay West	Newfoundland	11 O/11	7 June	2	4	2	1.8	1.5	-	4	1
2	Shallow Bay, Gros Morne National Park	Newfoundland	12 H/13	8 June	0	0	2	5	3	0	0	0
6	Shalloway Bay	Newfoundland	2 F/7	15 June	0	0	4	1.14	0.58	-	0	0
23	Ship Harbour Point	Newfoundland	1 N/5	15 June	0	0	1	1	1	-	-	-
61	Short Sand Beach	Newfoundland	11 O/11	12 June	1	2	1	0.5	0.25	-	0	2
36	St. Jacques Harbour	Newfoundland	1 M/6	6 June	0	0	1	0.5	0.5	-	-	-

# 2006 Piping Plover Census

Table 1 (cont'd). Results of the 2006 International Piping Plover Breeding Census in Newfoundland and St. Pierre et Miquelon (France).

Map no.	Site name	Location	1:50,000 NTS <sup>1</sup> map sheet	Date	2006				No. of hours	1991 census	1996 census	2001 census
					No. of pairs	No. of adults	No. of observers	Distance surveyed (km)				
71	Stephenville Crossing	Newfoundland	12 B/10	12 June	1	2	2	1	0.75	0	0	3
70	Stephenville Crossing <sup>4</sup>	Newfoundland	12 B/10	12 June	0	0	2	1.3	0.45	-	-	-
28	Taylor's Bay	Newfoundland	1 L/13	7 June	0	0	2	0.27	0.25	-	-	-
49	Third Beach – Sandbanks Provincial Park	Newfoundland	11 P/12	4 June	2	6	4	0.78	0.5	-	-	-
1	Western Brook Beach, Gros Morne National Park	Newfoundland	12 H/13	6 June	0	0	1	1.3	0.5	0	0	0
41	Western Cove	Newfoundland	1 M/5	7 June	0	0	2	1	0.75	-	-	-
12	Windmill Bight	Newfoundland	2 F/5	16 June	0	0	4	0.64	0.75	-	-	0
56	Wreck Island Beach	Newfoundland	11 P/12	3 June	0	0	4	0.3	0.16	-	-	-
	Totals	Newfoundland			16	48	25	103.88	59.71	7	27	39
<b>St. Pierre et Miquelon</b>												
1	Gully of Grand Barachois	St. Pierre et Miquelon	11P, 1	15 June	2	4	2	12	-	2	0	3
2	W side of Isthme de Langlade	St. Pierre et Miquelon	11P, 1	15 June	0	0	2	N/A	-	2	6	2
3	NE of Gully of Grand Barachois	St. Pierre et Miquelon	11P, 1	13 June	2	4	1	5	-	0	0	4
4	Dune de Miquelon <sup>5</sup>	St. Pierre et Miquelon	11P, 1	-	-	-	-	-	-	0	0	0
		St. Pierre et Miquelon			4	8	3	17	-	4	6	9
	Totals	Miquelon										

Table 1 (cont'd). Results of the 2006 International Piping Plover Breeding Census in Newfoundland and St. Pierre et Miquelon (France).

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<sup>1</sup> NTS = National Topographic System.

<sup>2</sup> Census was not finished.

<sup>3</sup> Site was included in detectability study. First date and first plover numbers refer to first survey. Grand Beach deemed not suitable so second survey not done.

<sup>4</sup> South side of bridge.

<sup>5</sup> Habitat not thought to be suitable.

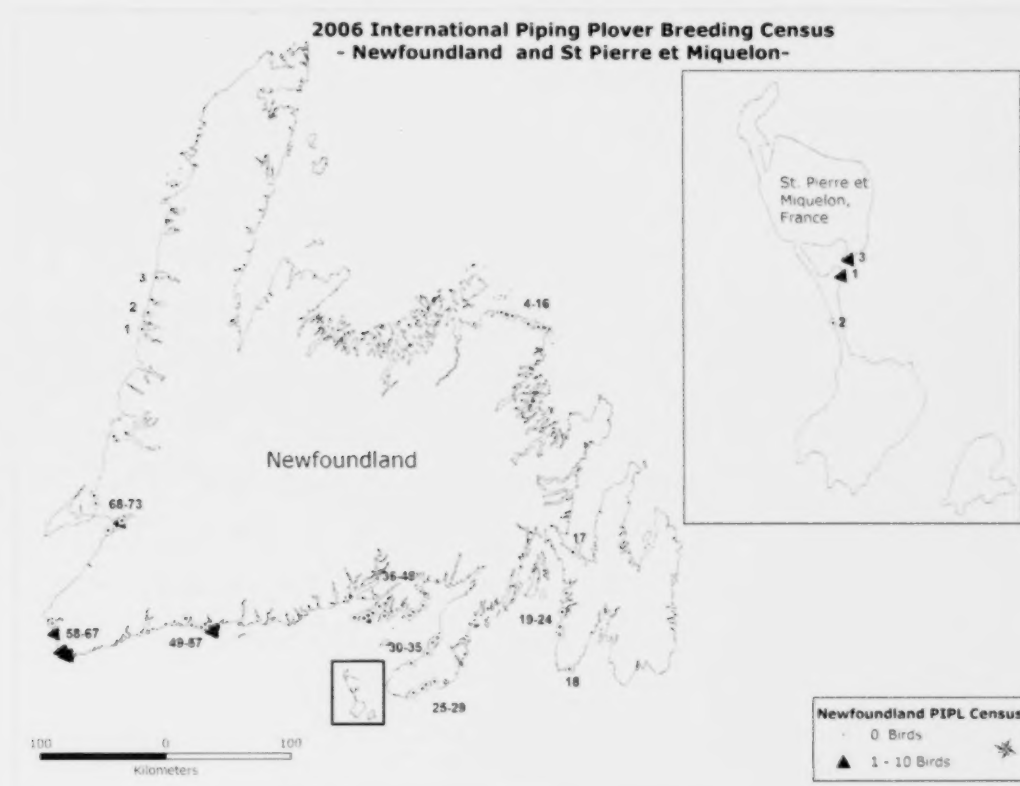


Figure 1. Location of sites censused in in Newfoundland and St-Pierre-et-Miquelon (France) during the 2006 International Piping Plover Breeding Census.

Table 2. Piping Plover productivity in insular Newfoundland (2006).

Site	No. of pairs monitored	Nesting attempts	Nests hatched	No. fledged	Productivity
Big Barasway - Seal Cove	2	2	2	1	0.50
Cape Ray Beach - J.T.					
Cheeseman Provincial Park	5	6	5	14	2.80
Osmond Beach	2	3	1	3	1.50
Short Sand Beach	1	1	1	1	1.00
Big Barachois Beach	2	2	2	5	2.50
Bottle's Barachois	1	1	1	4	4.00
Second Beach - Grand Bay West	3	3	3	10	3.33
Little Codroy Beach	2	2	1 <sup>1</sup>	Unknown	-
Stephenville Crossing	1	1	1	Unknown	-
Second Beach - Sandbanks					
Provincial Park	1	1	1	3	3.00
Third Beach - Sandbanks					
Provincial Park	1	1	1	2	2.00
Fourth Beach - Sandbanks					
Provincial Park	0	1	1	Unknown	-
Big Barasway - Burgeo	2	4	4	4	2.00
Totals	23	28	24 <sup>1</sup>	47	2.04

<sup>1</sup>Unsure if one or two nests were present at Little Codroy Beach. Two pairs were seen with four chicks, however it is unclear if all chicks belonged to one pair or if two broods were present. Total hatched nests may be 25 if in fact two nests hatched (rather than one) at this site.



## **The 2006 Piping Plover Census in Nova Scotia**

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### **Abstract**

Approximately 37 pairs of Piping Plovers and 13 singles (87 adults) were observed in Nova Scotia during the 2006 census. Additional surveys conducted as part of a detectability study suggest that approximately 36-37 pairs of plovers (83-87 adults) were present in Nova Scotia during the June 5-16 (2006) period. The maximum numbers of birds during the two counts for the detectability study are reported here because double-counting was improbable. This estimate represents a decrease of  $>6\%$  from 2001 when 93 Piping Plovers, including 43 pairs and seven singles, were counted. This decrease was not consistent across the province. The number of adults in northern Nova Scotia has increased dramatically ( $+94\%$ ) since the 2001 census (16 adults in 2001 versus 31 adults in 2006) and productivity in this region has been above two chicks fledged per pair monitored since 2001. The population increase and high productivity have occurred despite the minimal protection measures afforded. Conversely, the number of adults in southern Nova Scotia has shown a substantial decline since 2001 ( $>25\%$ ; from 77 adults in 2001 down to 56 in 2006) and the number of occupied sites has fallen from 30 in 1991 to 18 in 2006. The decline in southern Nova Scotia has occurred despite tremendous recovery effort.

A comparison of plover dynamics between the two regions of Nova Scotia has not been completed. However, we suspect that anthropogenic threats are less of a factor in northern Nova Scotia, the predator suite is less harmful, and the habitat may be more favourable for plovers than in southern Nova Scotia.

### **Résumé**

Lors du recensement de 2006 en Nouvelle-Écosse, on a observé environ 37 couples de pluviers siffleurs et 13 individus, pour un total de 87 oiseaux adultes. D'autres sondages menés dans le cadre d'une étude de détectabilité portent à croire qu'environ 36 ou 37 couples de pluviers, soit de 83 à 87 oiseaux adultes, se trouvaient en Nouvelle-Écosse durant la période du 5 au 16 juin 2006. Si le nombre maximal d'oiseaux observés durant les deux recensements de

l'étude de détectabilité est reporté ici, c'est que le double comptage était improbable. Cette estimation représente une diminution de -6 % par rapport aux données de 2001, puisqu'on avait alors recensé 93 pluviers siffleurs, soit 43 couples et 7 individus. Cette diminution n'était pas uniforme dans toute la province. En effet, depuis le recensement de 2001, le nombre d'oiseaux adultes dans le nord de la Nouvelle-Écosse a augmenté considérablement (+94 %), voyant ainsi passer sa population de pluviers de 16 à 31 oiseaux adultes entre 2001 et 2006. De surcroît, la productivité dans cette région pour les couples suivis depuis 2001 a été de plus de deux jeunes à l'envol par couple. Cette augmentation de la population ainsi que cette forte productivité ont eu lieu en dépit du fait que la région ne bénéficiait que de mesures de protection minimales. À l'inverse, le nombre d'oiseaux adultes dans le sud de la Nouvelle-Écosse a connu une diminution considérable depuis 2001 (-25 %), voyant ainsi passer sa population de pluviers de 77 à 56 oiseaux adultes entre 2001 et 2006. De plus, le nombre de sites occupés a chuté, passant ainsi de 30 à 18 entre 1991 et 2006. Cette diminution dans le sud de la Nouvelle-Écosse a eu lieu en dépit des efforts de récupération colossaux qui y sont déployés.

Une comparaison de la dynamique des pluviers entre les deux régions de la Nouvelle-Écosse est en cours. Cependant, nous sommes portés à croire que les menaces anthropiques ne constituent pas un facteur déterminant dans le nord de la Nouvelle-Écosse, que la présence des prédateurs a moins d'incidence et que l'habitat pourrait y être plus favorable pour les pluviers que dans le sud de la Nouvelle-Écosse.

### Introduction

Piping Plovers were listed as Endangered in 2000 under the Nova Scotia Endangered Species Act (1998), and as Endangered under the federal *Species at Risk Act* (proclaimed in 2003). A new Off-highway Vehicle (OHV) Act came into effect in Nova Scotia in April 2006. This Act states that OHVs cannot legally operate in sensitive areas including beaches defined under the Beaches Act or in Core Habitat designated under the Nova Scotia Endangered Species Act. Unfortunately, more plovers occur at sites that are not designated under the Beaches Act than at protected sites and Core Habitat for Piping Plovers has not been designated to date. Despite this, enforcement officers with the Nova Scotia Department of Natural Resources now frequently patrol many sites with breeding plovers.

Preliminary results from a regional banding study suggest that plovers in southern Nova Scotia may be reproductively isolated from plovers in northern Nova Scotia (D. Amirault-Langlais, unpubl. data) and thus, census results have been analyzed separately for these regions.

This report summarizes results of the 2006 Nova Scotia provincial census and the outcome of monitoring efforts by Bird Studies Canada, Canadian Wildlife Service, Nova Scotia Department of Natural Resources, Parks Canada, and Nova Scotia Piping Plover Guardians.

### Methods

One hundred and thirty-two sites (Figure 1) were assessed for inclusion in the 2006 census. Regional Biologists with the Department of Natural Resources, familiar with each beach site, were asked to comment on the potential suitability of sites for breeding plovers. Of the 132 sites, 127 were surveyed in at least one previous census and five were new sites thought to have potential habitat for Piping Plovers. Twenty-nine sites were deemed unsuitable and were removed from the census list, leaving a total of 103 sites to survey. Plovers were recorded at only one of the 29 unsuitable sites in a previous census: "Conrads, Petpeswick Inlet" was surveyed in 1991, 1996, and 2001 with one pair and a single observed in 1996. Surveyors were asked to visit 15 sites twice as part of a detectability study. Surveying methodology followed prescribed census protocols.

Bird Studies Canada, Canadian Wildlife Service, Nova Scotia Department of Natural Resources, and Parks Canada staff, as well as volunteer Piping Plover Guardians collected nesting data at 20 beach sites. Investigators followed nesting pairs until the result of a nesting attempt was determined and outcome of young was ascertained at 25 days or when young were observed in sustained flight. Productivity was calculated as the number of fledged young per pair monitored on a given beach.

### Results

In all, 99 sites were surveyed during the 2006 International Piping Plover Census. Of the 103 sites to be surveyed, four were missed due to weather and difficulty of access. These were: "Grahams Cove/Ferry Road", "Fish Island, Inner (The Cape)", and "Ratcliffe Hills (The Cape)". Only "Inner (the Cape)" was known to have plovers in previous years (one pair in 1991, none in 1996, and one pair in 2001). Twelve of 15 sites were surveyed twice as part of the detectability study; three were not revisited due to inaccessibility and include: "John Dans Cove" and "North Shore", both located on Pictou Island, and "Baltee Island (Romkey's Point)".

Thirty-eight individuals spent over 117 hours surveying approximately 137 km of coastline for the 2006 census. Participants were associated with Bird Studies Canada (2), Canadian Wildlife Service (4), Nova Scotia Bird Society (1), Nova Scotia Department of Natural Resources (25), Parks Canada (1), or were volunteers without affiliation (5).

The international census was completed in Nova Scotia during 5–16 June 2006 (Table 1). Only one deviation from the census period was reported: a survey on 22 May was used as the first visit for “South West Mabou” (a site included in the detectability study). The second census for this site occurred on 5 June with identical counts of birds. Reported weather conditions during surveys were, for the most part, satisfactory; however, seven surveys were undertaken with some amount of fog or rain.

Counts of plovers differed between subsequent surveys at three of the 12 sites revisited as part of the detectability study. These were: “Pomquet”, “North Harbour”, and “Black Point”. On “Pomquet”, one pair lost its nest after the first survey and the pair was not subsequently observed on that or any nearby beach. A single was observed on “Black Point” during the first survey, but not resighted during the second survey, and a single was recorded on “North Harbour” during the second survey but not sighted during the first. Counts of plovers are here stated as a range from the minimum count to maximum count. In all, 36–37 pairs of plovers (83–87 adults) were observed province-wide. In northern Nova Scotia, 11–12 pairs and 6–7 singles (28–31 adults) were recorded and 25 pairs and 5–6 singles (55–56 adults) were observed in southern Nova Scotia.

The number of occupied sites in Nova Scotia has undergone dramatic change since the first census: the number of occupied sites in northern NS was five, six, four, and nine in 1991, 1996, 2001, and 2006, respectively; and 30, 19, 20, and 18 for southern Nova Scotia.

Changes to the distribution of plovers have occurred since the 2001 census. The maximum numbers of birds during two counts for the detectability study are used hereafter. In northern NS, six previously unoccupied sites gained plovers (+14 adults), one site increased in numbers (+3 adults) and one previously occupied site did not have plovers in 2006 (-2 adults). These changes resulted in a net gain of +15 adult plovers in northern Nova Scotia. In southern Nova Scotia, five previously unoccupied sites gained plovers (+8 adults), one newly surveyed site (“Crescent”, Shelburne County) had plovers in 2006 (+2 adults), and four sites saw an increase in the number of plovers (+9 adults). Decreases in southern Nova Scotia were as follows: seven sites lost plovers entirely since 2001 (-19 adults), one site was missed in 2006 (“Inner, The Cape” had two adults in 2001), and five sites experienced a decline in the number of plovers (-19 adults). These changes resulted in a net decrease of -21 plovers from southern Nova Scotia beaches.

### Discussion

The number of adults in northern Nova Scotia increased considerably since the 2001 Census (16 adults in 2001 versus 31 adults in 2006). Little change in density was observed at previously

occupied sites and the increase in plover numbers in the north occurred mainly at new sites (nine occupied sites in 2006 compared to four in 2001). Productivity was consistently high at sites in northern Nova Scotia between the 2001 and 2006 International Censuses and immigration may have also contributed to the observed increase. Of four birds captured in northern Nova Scotia in 2006, two were previously captured as breeding birds in Prince Edward Island. One of these two plovers was originally banded in New Brunswick in 2000, and recaptured nesting in Prince Edward Island in 2003 before eventually being recaptured breeding in northern Nova Scotia in 2006.

Little protection from human disturbance, such as symbolic fencing or signed nesting areas, is used at northern Nova Scotia beaches and exclosures are not used due to limited staff. Despite this lack of protection, productivity has been above two chicks fledged per pair monitored since 2001. Productivity in 2006 was calculated to be 2.42 chicks fledged per pair for 12 monitored pairs at six sites.

The southern Nova Scotia Piping Plover population has experienced a substantial decline both in number of adults (77 adults in 2001 versus 56 in 2006) and in number of occupied sites. During the first International Census in 1991, plovers were found at 30 sites in southern Nova Scotia and at only 18 sites in 2006. A redistribution of birds was observed in southern Nova Scotia, but the decline observed between 2001 and 2006 resulted not only due to the complete abandonment of plovers from seven sites but also from a reduced number of birds at sites occupied in both years. Plover numbers began to decline in the south in 2003 and have since shown no improvement. With the exception of 2005, when productivity was above two chicks fledged per pair (2.27; 22 pairs monitored), productivity estimates for the south have been consistently below the 1.65 chicks fledged per pair target calculated to maintain the population at its current level (Calvert 2004) since 2001. In 2006, productivity was measured for plovers at 14 sites in southern Nova Scotia and was estimated to be 1.52 chicks fledged per pair (25 pairs monitored).

The decline in southern Nova Scotia has occurred despite tremendous recovery effort. Signage was placed at all nests except at two sites previously targeted by vandals. Exclosures were regarded as an effective way to reduce nest loss in 2000 and 2001, but problems with seemingly exclosure-smart predators in 2002 reduced their effectiveness; use of exclosures was minimized thereafter. Exclosures were effective at increasing the probability of hatching in 2001, 2004, and 2005; however, high abandonment rates were associated with exclosure use in 2003 and 2006 (J. McKnight, unpubl. data).

Detailed nest outcomes were recorded at nine of the 12 sites that experienced a decline in the number of plovers in southern Nova Scotia from 2001 to 2006. The results indicate that nests are most often lost due to predation or eggs disappearing (in these cases, predation is suspected but not

proven) followed by flooding (J. McKnight, unpubl. data). At the sites where flooding was an issue, some habitat degradation seems to have occurred ("Ragged Harbour", "Round Bay & Roseway", and "Sand Hills Provincial Park (Sebim)"). Perhaps more significant than nest loss is the loss of breeding adult plovers: single episodes of adult predation were recorded at "Daniels Head (Southside)" in 2002 and "Ragged Harbour" in 2003.

We have not conducted formal research to investigate why such disparity in plover dynamics exists between the two regions of Nova Scotia. However, we suspect that anthropogenic threats are less of a factor in northern Nova Scotia, the predator suite is less harmful, and the habitat may be more favourable for plovers than in southern Nova Scotia. Anecdotal evidence suggests that northern Nova Scotia beaches are longer, less narrow and have more cobble than sites in southern Nova Scotia.

### **Acknowledgements**

Many thanks are extended to personnel and volunteers from Bird Studies Canada, Canadian Wildlife Service, Nova Scotia Department of Natural Resources, and Parks Canada as well as volunteer Piping Plover Guardians and other individual (non-associated) volunteers who participated in the census and/or in collecting productivity data. These are: Allan Jackson, Allison Hallet, Amber Vines, Andrew Boyne, Anna McCarron, Avery Nagy, Brad Toms, Bruce Murphy, Craig Frail, Dave Seaboyer, Don Anderson, Donna Crosby, Doug Archibald, Glen Boutilier, Ingrid Nagy, James Hirtle, Jamie Brown, Jason McLean, Jennifer Stephen, Jenny Costelo, John Mills, Kelly Sadlier, Ken McKenna, Kerry Caverhill, Kim George, Lily Nagy, Lynn Mills, Mark Pulsifer, Michelle Beaulieu, Monik Richard, Pamela Mills, Peter Colp, Peter MacDonald, Pius Chisolm, Richard Brunt, Robert MacEachern, Steve Vines, Sue Abbott, Suzanne Brown, Terry Beck, Terry Power, and Tim Locke. In particular, thanks go to Sue Abbott of Bird Studies Canada for suggestions regarding the completion of this manuscript.



2006 International Piping Plover Breeding Census  
- Nova Scotia -



Figure 1. Location of sites censused in Nova Scotia during the 2006 International Piping Plover Breeding Census.

Table 1. Results of 2006 International Piping Plover Breeding Census in Nova Scotia.

Map no.	Site name	Region	County	1:50,000 NTS <sup>1</sup> map sheet	Date <sup>2</sup>	2006 census					1991 census	1996 census	2001 census
						No. of pairs <sup>2</sup>	No. of adults <sup>2</sup>	No. of observers	Distance surveyed (km)	No. of hours			
104	"Bayfield"	n NS <sup>3</sup>	Antigonish	11 F/12	12 June	0	0	1	0.75	0.50	0	0	0
33	"Captains Pond and Monks Head"* <sup>4</sup>	n NS	Antigonish	11 F/12	13 June [16 June]	0	0 [0]	2	1.80	2.25	0	2	0
32	"Dunns"	n NS	Antigonish	11 F/12	13 June	0	0	1	2.8	1.50	0	0	0
36	"Grahams Cove / Ferry Road"	n NS	Antigonish	11 F/12	nc <sup>5</sup>	.	.	.	.	.	0	0	0
30	"Jimtown"	n NS	Antigonish	11 F/12	12 June	0	0	1	0.5	0.50	.	0	.
39	"Linwood"	n NS	Antigonish	11 F/12	u <sup>6</sup>	.	.	.	.	.	.	0	0
31	"Mahoneys"	n NS	Antigonish	11 F/12	15 June	3	6	3	1.1	1.50	0	4	6
34	"Ogdens Pond"	n NS	Antigonish	11 F/12	12 June	0	0	1	0.67	0.50	.	.	0
35	"Pomquet"*	n NS	Antigonish	11 F/12	6 June [13 June]	4 [3]	9 [7]	1	7.60	6.17	2	6	6
29	"South Lakevale (Cribbons)"* <sup>7</sup>	n NS	Antigonish	11 F/13	11 June [13 June]	0	0 [0]	1	1.80	1.92	.	0	0
38	"Tracadie Big Island / Delorey"	n NS	Antigonish	11 F/12	u	.	.	.	.	.	0	0	0
37	"Tracadie West Arm"	n NS	Antigonish	11 F/12	u	.	.	.	.	.	0	0	0
55	"Belfry to Winging Point"	n NS	Cape Breton	11 F/16	u	.	.	.	.	.	.	.	0
51	"Dominion (Lingan)"	n NS	Cape Breton	11 K/01	15 June	0	0	2	2	1.00	2	0	0
52	"Glance Bay Bar"	n NS	Cape Breton	11 J/04	16 June	1	2	1	2	2.17	0	0	0
54	"Kennington Cove"	n NS	Cape Breton	11 F/16	u	.	.	.	.	.	0	0	.



## 2006 Piping Plover Census

Table 1 (cont'd). Results of 2006 International Piping Plover Breeding Census in Nova Scotia .

Map no.	Site name	Region	County	1:50,000 NTS <sup>1</sup> map sheet	Date <sup>2</sup>	2006 census					1991 census	1996 census	2001 census
						No. of pairs <sup>2</sup>	No. of adults <sup>2</sup>	No. of observers	Distance surveyed (km)	No. of hours			
53	"Port Morien"	n NS	Cape Breton	11 J/04	15 June	0	0	2	0.5	0.75	.	.	.
50	"South (East) Bar"	n NS	Cape Breton	11 K/01	16 June	0	0	1	1	1.00	.	0	0
132	"Sand Point"	n NS	Colchester	21 H/08	7 June	0	0	2	0.8	1.25	.	0	0
1	"Cameron"	n NS	Cumberland	11 E/13	7 June	0	0	2	0.6	0.50	0	0	0
5	"Hortons"	n NS	Cumberland	11 E/14	7 June	0	0	1		1.00	0	0	0
4	"Long" (Cumberland Co.)	n NS	Cumberland	11 E/14	7 June	0	0	1	0.25	0.75	0	0	0
3	"Oak Island"	n NS	Cumberland	11 E/14	16 June	0	0	1	2.43	1.70	0	2	0
6	"Treen Point / Malagash Mines"	n NS	Cumberland	11 E/14	7 June	0	0	1	1	1.75	0	0	0
2	"West Pugwash"*	n NS	Cumberland	11 E/13	9 June [16 June]	0	0 [0]	1	1.25	2.02	0	0	0
65	"Clam Pond"	n NS	Guysborough	11 F/06	u	.	.	.	.	.	0	0	.
64	"Ragged Head Pond"	n NS	Guysborough	11 F/06	u	.	.	.	.	.	0	0	.
66	"Tor Bay"	n NS	Guysborough	11 F/03	12 June	0	0	0	0.575	0.67	.	0	0
47	"Belle Cote"	n NS	Inverness	11 K/06	11 June	0	0	1	1.7	1.50	.	.	.
40	"Big Rorys (Emerson) Point"	n NS	Inverness	11 F/13	12 June	0	0	1	0.79	0.75	0	0	0
43	"Colindale"*	n NS	Inverness	11 K/04	5 June [12 June]	0	0 [0]	1	0.57	1.50	0	0	0
45	"Inverness Beach"	n NS	Inverness	11 K/03	12 June	0	0	2	3.5	1.92	.	.	.

# 2006 Piping Plover Census

Table 1 (cont'd). Results of 2006 International Piping Plover Breeding Census in Nova Scotia.

Map no.	Site name	Region	County	1:50,000 NTS <sup>1</sup> map sheet	Date <sup>2</sup>	2006 census					1991 census	1996 census	2001 census
						No. of pairs <sup>2</sup>	No. of adults <sup>2</sup>	No. of observers	Distance surveyed (km)	No. of hours			
41	"Little Judique Harbour"	n NS	Inverness	11 F/13	6 June	0	0	2	0.6	0.67	0	0	0
46	"Margaree Harbour"	n NS	Inverness	11 K/06	11 June	0	0	1	0.5	1.50	.	.	.
42	"Shipping Point"	n NS	Inverness	11 K/04	6 June	2	4	2	1.9	1.33	0	0	0
44	"South West Mabou"*	n NS	Inverness	11 K/03	22 May [5 June]	1	2 [2]	1	1.70	2.00	.	.	0
28	"Big Merigomish Island"	n NS	Pictou	11 E/09	14 June	0	0	1	4.9	2.22	0	0	0
23	"Bowen Island"	n NS	Pictou	11 E/10	8 June	0	0	2	0.88	1.33	4	2	2
8	"Cape John, Megs Cove"	n NS	Pictou	11 E/14	8 June	0	0	2	0.7	1.00	.	.	0
12	"Caribou Island, Caribou Reef"	n NS	Pictou	11 E/15	15 June	0	0	2	0.7	1.00	0	0	0
11	"Caribou Island, Hawksbill Point"	n NS	Pictou	11 E/15	u	.	.	.	.	.	.	.	0
10	"Caribou Island, Narrows"	n NS	Pictou	11 E/15	u	.	.	.	.	.	.	.	0
20	"Chance Harbour"	n NS	Pictou	11 E/10	7 June	0	0	1	1.6	0.83	.	0	0
24	"James and Little Harbour Spit"	n NS	Pictou	11 E/10	8 June	1	2	2	1	1.17	1	0	0

Table 1 (cont'd). Results of 2006 International Piping Plover Breeding Census in Nova Scotia.

Map no.	Site name	Region	County	1:50,000 NTS <sup>1</sup> map sheet	Date <sup>2</sup>	2006 census					1991 census	1996 census	2001 census
						No. of pairs <sup>2</sup>	No. of adults <sup>2</sup>	No. of observers	Distance surveyed (km)	No. of hours			
26	"Kings Head"*	n NS	Pictou	11 E/09	8 June [16 June]	0	0 [0]	2	1.20	2.58	0	0	0
25	"Melmerby"	n NS	Pictou	11 E/10	12 June	0	3	1	2.5	2.33	0	0	0
19	"Pictou Bar Spit (Lighthouse)"	n NS	Pictou	11 E/10	12 June	0	0	1	1.5	1.00	2	0	0
18	"Pictou Island, East End"	n NS	Pictou	11 E/15	6 June	0	0	2	0.989	0.42	.	.	0
17	"Pictou Island, John Dans Cove"	n NS	Pictou	11 E/15	6 June	0	0	2	0.6	0.50	.	.	0
16	"Pictou Island, North Shore"	n NS	Pictou	11 E/15	6 June	0	0	2	1.06	0.50	.	0	0
15	"Pictou Island, Roger Point"	n NS	Pictou	11 E/15	6 June	0	0	2	1.57	0.82	.	0	0
14	"Pictou Island, West End"	n NS	Pictou	11 E/15	u	.	.	.	.	.	.	.	0
13	"Pictou Island, Wharf"	n NS	Pictou	11 E/15	u	.	.	.	.	.	.	.	0
21	"Roaring Bull Point"	n NS	Pictou	11 E/10	7 June	0	0	1	1.5	0.25	0	0	0
7	"Rushtons Park (Murray)"	n NS	Pictou	11 E/14	9 June	0	0	2	0.65	1.50	0	0	0
27	"Savage Point, Big Merigomish Island"	n NS	Pictou	11 E/09	14 June	0	0	1	0.55	0.43	0	0	0
22	"Sinclairs Island"	n NS	Pictou	11 E/10	7 June	0	0	1	1.31	0.58	0	0	0

Table 1 (cont'd). Results of 2006 International Piping Plover Breeding Census in Nova Scotia.

Map no.	Site name	Region	County	1:50,000 NTS <sup>1</sup> map sheet	Date <sup>2</sup>	2006 census					1991 census	1996 census	2001 census
						No. of pairs <sup>2</sup>	No. of adults <sup>2</sup>	No. of observers	Distance surveyed (km)	No. of hours			
9	"Waterside Beach Park"	n NS	Pictou	11 E/15	15 June	0	0	2	0.6	0.67	-	-	0
57	"Crossroads (L'Ardoise)"	n NS	Richmond	11 F/10	U	-	-	-	-	-	-	-	0
58	"Grande Greve"	n NS	Richmond	11 F/10	U	-	-	-	-	-	-	-	0
56	"Morrisons, Framboise"	n NS	Richmond	11 F/09	U	-	-	-	-	-	-	-	0
59	"Point Michaud"	n NS	Richmond	11 F/10	U	-	-	-	-	-	-	-	0
62	"Pondville"	n NS	Richmond	11 F/10	U	-	-	-	-	-	-	-	0
60	"Rear Point Michaud (Western)"	n NS	Richmond	11 F/10	U	-	-	-	-	-	-	-	0
61	"Rockdale"	n NS	Richmond	11 F/10	U	-	-	-	-	-	-	-	0
63	"Rocky Bay"	n NS	Richmond	11 F/10	U	-	-	-	-	-	-	-	0
48	"North Harbour"*	n NS	Victoria	11 K/16	7 June [13 June]	0	0 [1]	1	5.13	5.50	0	0	0
49	"South Harbour"	n NS	Victoria	11 K/16	7 June	0	2	1	3.6	1.83	0	3	2
	Total	n NS				11-12	28-31				11	19	16
70	"Baltee Island (Romkey's Point)"	s NS <sup>7</sup>	Halifax	11 D/15	6 June	0	0	3	0.3	0.10	-	0	0
67	"Bull. Taylor Head Provincial Park"	s NS	Halifax	11 D/15	8 June	0	0	1	0.3	1.25	-	-	0
73	"Clam Harbour"	s NS	Halifax	11 D/10	13 June	0	0	1	1.5	2.00	2	0	0

# 2006 Piping Plover Census

Table 1 (cont'd). Results of 2006 International Piping Plover Breeding Census in Nova Scotia.

Map no.	Site name	Region	County	1:50,000 NTS <sup>1</sup> map sheet	Date <sup>2</sup>	2006 census					1991 census	1996 census	2001 census
						No. of pairs <sup>3</sup>	No. of adults <sup>2</sup>	No. of observers	Distance surveyed (km)	No. of hours			
75	"Conrads (East and West)"	s NS	Halifax	11 D/11	16 June	0	1	1	2	1.50	2	0	0
76	"Conrads, Petpeswick Inlet"	s NS	Halifax	11 D/11	u	.	.	.	.	.	0	3	0
77	"Cow Bay"	s NS	Halifax	11 D/11	u	.	.	.	.	.	0	0	0
78	"Fishermans"	s NS	Halifax	11 D/11	u	.	.	.	.	.	0	0	0
79	"Lawrencetown"	s NS	Halifax	11 D/11	16 June	0	0	1	1	0.50	.	0	0
72	"Little Harbour (Sandbar Beach)"	s NS	Halifax	11 D/10	12 June	0	0	1	1	2.75	.	.	0
80	"Long (Meisners)"	s NS	Halifax	11 D/11	u	.	.	.	.	.	0	0	0
81	"Martinique"	s NS	Halifax	11 D/11	7 June	2	4	2	3	2.08	2	0	3
82	"Maugher, McNabs Island"	s NS	Halifax	11 D/12	14 June	0	0	2	1.4	0.75	0	0	0
83	"McCormack's, Eastern Passage"	s NS	Halifax	11 D/11	u	.	.	.	.	.	.	0	0
84	"Rainbow Haven Park (Cole Harbour)"	s NS	Halifax	11 D/11	14 June	0	0	1	1.78	1.00	3	0	0
71	"Sandy Cove and Eastern Sandy Cove"	s NS	Halifax	11 D/15	6 June	0	0	3	0.3	0.10	.	0	0
69	"Sandy Cove West"	s NS	Halifax	11 D/15	6 June	0	0	3	0.3	0.12	.	.	0
74	"Seapool"	s NS	Halifax	11 D/10	12 June	0	0	1	0.5	2.00	0	0	0
85	"Stoney (Lawrencetown Head)"	s NS	Halifax	11 D/11	16 June	0	0	1	0.75	0.60	2	0	0

# 2006 Piping Plover Census

Table 1 (cont'd). Results of 2006 International Piping Plover Breeding Census in Nova Scotia.

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						No. of pairs <sup>2</sup>	No. of adults <sup>2</sup>	No. of observers	Distance surveyed (km)	No. of hours			
68	"Taylor Head Bay"*	s NS	Halifax	11 D/15	7 June [16 June]	0	0 [0]	1	0.70	3.50	0	0	0
86	"Bayswater"	s NS	Lunenburg	21 A/08	U	.	.	.	.	.	0	0	0
96	"Cape Bay, Cape LaHave Island"	s NS	Lunenburg	21 A/01	6 June	2	4	4	2	1.25	4	2	1
97	"Cherry Hill (Conrad)"	s NS	Lunenburg	21 A/02	10 June	2	4	1	1.96	.	6	1	6
91	"Halibut Bay, Cape LaHave Island"	s NS	Lunenburg	21 A/01	U	.	.	.	.	.	0	0	0
92	"Hirtles"	s NS	Lunenburg	21 A/08	7 June	1	2	2	1	1.75	0	0	0
93	"Kingsburg"	s NS	Lunenburg	21 A/08	7 June	0	0	2	0.6	0.75	0	0	0
89	"Masons"	s NS	Lunenburg	21 A/08	U	.	.	.	.	.	0	0	0
90	"Masons Island"	s NS	Lunenburg	21 A/08	6 June	0	0	3	0.3	0.33	0	0	0
94	"Oxners Beach"	s NS	Lunenburg	21 A/08	5 June	0	0	1	1	0.75	.	.	2
87	"Rafuse Island"	s NS	Lunenburg	21 A/08	6 June	0	0	1	0.5	0.33	0	0	0
88	"Sloop Cove (Mosher's Island)"	s NS	Lunenburg	21 A/01	U	.	.	.	.	.	0	0	0
95	"The Creek, Cape LaHave Island"	s NS	Lunenburg	21 A/01	6 June	0	0	4	1.5	0.75	0	0	0
99	"Beach Meadows"	s NS	Queens	21 A/02	12 June	0	0	1	0.98	0.40	4	2	0
101	"Carters & Wobamkek"	s NS	Queens	20 P/15	14 June	0	0	2	1.58	0.60	4	2	0
105	"Cranberry Pond"	s NS	Queens	20 P/15	14 June	0	0	3	1	0.25	2	0	.
100	"Gull Island"	s NS	Queens	20 P/15	14 June	0	0	3	0	0.17	0	0	.

## 2006 Piping Plover Census

Table 1 (cont'd). Results of 2006 International Piping Plover Breeding Census in Nova Scotia.

Map no.	Site name	Region	County	1:50,000 NTS <sup>1</sup> map sheet	Date <sup>2</sup>	2006 census					1991 census	1996 census	2001 census
						No. of pairs <sup>2</sup>	No. of adults <sup>2</sup>	No. of observers	Distance surveyed (km)	No. of hours			
106	Little Port Joli Bay, KejiNP <sup>8</sup>	s NS	Queens	20 P/15	10 June	0	0	1	2.25	1.58	2	0	0
107	"Port Joli (Goose Haven)"	s NS	Queens	20 P/15	12 June	0	0	1	0.16	0.17	4	0	0
102	"Port Mouton Island"	s NS	Queens	20 P/15	14 June	0	0	3	1	0.25	0	1	0
98	"Ragged Harbour"	s NS	Queens	21 A/02	12 June	0	0	1	0.29	0.10	.	2	2
108	"Sandy Bay"	s NS	Queens	20 P/15	14 June	0	0	2	2	0.68	2	2	1
109	St. Catherines River, KejiNP <sup>8</sup>	s NS	Queens	20 P/15	16 June	5	12	1	3.25	6.25	8	8	8
103	"Summerville"	s NS	Queens	20 P/15	12 June	0	0	1	1.3	0.32	7	4	4
110	"Black Point"*	s NS	Shelburne	20 P/11	12 June [14 June]	0	1[0]	1	2.00	2.22	3	0	0
114	"Blanche Island Bar"	s NS	Shelburne	20 P/06	u	.	.	.	.	.	0	.	0
115	"Bulls Head"	s NS	Shelburne	20 P/05	14 June	0	0	1	0.2	0.50	.	3	.
116	"Burks Point"	s NS	Shelburne	20 P/05	6 June	1	2	1	1.07	0.48	2	0	0
117	"Clam Point"	s NS	Shelburne	20 P/05	13 June	0	0	2	1.81	0.18	2	0	2
111	"Crescent" (Shelburne Co.)	s NS	Shelburne	20 P/11	5 June	1	2	2	0.78	0.53	.	.	.
118	"Crow Neck (Baccaro)"	s NS	Shelburne	20 P/06	6 June	3	6	2	1.6	0.83	6	6	8
119	"Daniels Head (Southside)"	s NS	Shelburne	20 P/05	13 June	1	2	2	2.72	1.05	7	6	12
120	"Fish Island"	s NS	Shelburne	20 P/05	Nc	.	.	.	.	.	.	.	0
121	"Fox Bar"	s NS	Shelburne	20 P/11	5 June	1	2	2	1.12	0.73	4	4	4



# 2006 Piping Plover Census

Table 1 (cont'd). Results of 2006 International Piping Plover Breeding Census in Nova Scotia.

Map no.	Site name	Region	County	1:50,000 NTS <sup>1</sup> map sheet	Date <sup>2</sup>	2006 census					1991 census	1996 census	2001 census
						No. of pairs <sup>2</sup>	No. of adults <sup>2</sup>	No. of observers	Distance surveyed (km)	No. of hours			
122	"Goose (Indian Point")*	s NS	Shelburne	20 P/05	6 June [12 June]	0	0 [0]	1	0.61	0.63	2	0	0
123	"Hawk Point"	s NS	Shelburne	20 P/05	13 June	1	2	2	1.45	0.82	.	.	2
124	"Inner / The Cape"	s NS	Shelburne	20 P/05	Nc	.	.	.	.	.	2	0	2
112	"Johnstons Pond"*	s NS	Shelburne	20 P/15	6 June [14 June]	1	3 [3]	2	0.81	1.75	2	3	2
113	"Louis Head"	s NS	Shelburne	20 P/14	14 June	1	2	2	1.88	0.72	4	5	0
125	"Northeast Point"	s NS	Shelburne	20 P/12	7 June	0	0	2	0.59	0.23	2	0	0
126	"Ratcliffe Hills (The Cape)"	s NS	Shelburne	20 P/05	Nc	.	.	.	.	.	.	.	0
127	"Red Head"	s NS	Shelburne	20 P/11	5 June	1	2	2	1.45	0.62	2	0	2
128	"Round Bay & Roseway"	s NS	Shelburne	20 P/11	5 June	0	0	2	1.72	0.55	6	3	4
129	"Sand Hills Provincial Park (Sebim)"	s NS	Shelburne	20 P/12	6 June	1	3	2	2.26	0.92	3	1	6
130	"Stoney Island"	s NS	Shelburne	20 P/05	12 June	1	2	2	0.93	1.30	0	0	2
131	"The Hawk"	s NS	Shelburne	20 P/05	13 June	0	0	2	0.87	0.43	1	2	4
	Total	s NS				25	55-56				102	60	77
Provincial total						36-37	83-87						

<sup>1</sup> NTS = National Topographic System

<sup>2</sup> Dates and numbers in [ ] represent data from the second visit as part of the detectability study.

<sup>3</sup> n NS= northern Nova Scotia

<sup>4</sup> \*= Beaches visited twice for the detectability study.

<sup>5</sup> nc = not censused

<sup>6</sup> u = unsuitable habitat.

<sup>7</sup> s NS= southern Nova Scotia      <sup>8</sup> KejNP = Kejimikujik National Park

## **The 2006 Piping Plover Census in Prince Edward Island**

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### **Abstract**

The 2006 International Piping Plover Breeding Census was conducted from 1-16 June on Prince Edward Island (PEI). A total of 86 beaches, including 74 beaches outside PEI National Park (PEINP) and 12 inside the park, were surveyed using 19 trained volunteers and Island Nature Trust and Parks Canada staff. All known Piping Plover sites were censused.

A total of 95 adult Piping Plovers (45 pairs plus 5 singles) were counted across the island from western Prince County to extreme eastern Kings County. This estimate represents a decrease from the 2001 provincial total of 112 Piping Plovers (-15%). Sixty-eight plovers (68), or 72% of the provincial population were recorded outside PEINP, and 27 plovers or 28% were recorded inside the park.

Protection of plovers outside PEINP has continued, with all nesting areas protected by signage and symbolic fencing (except difficult to access off-shore islands). Regular population monitoring by volunteers and staff occurs throughout the season. Predator exclosures are used where they can be checked frequently. Nesting effort and productivity is monitored at all nests (except some off-shore islands). Protection of plovers inside PEINP remains high, with closed areas, enforcement, education, daily monitoring, predator exclosures and legal protection provided through national park designation.

### **Résumé**

Le recensement international des pluviers siffleurs de 2006 à l'Île-du-Prince-Édouard (Î.-P.-É.) a été effectué du 1 au 16 juin. Au total, 86 plages, soit 74 à l'extérieur du parc national de l'Île-du-Prince-Édouard et 12 à l'intérieur, ont été prospectées par 19 bénévoles formés et membres du personnel d'Island Nature Trust et de Parks Canada. Tous les sites connus où vit le pluvier siffleur ont fait l'objet d'observations.

On a dénombré au total 95 pluviers siffleurs adultes (45 couples et 5 individus) dans l'île, du comté de Prince à l'ouest au comté de Kings à l'extrême est. Pour la province, cela constitue une baisse de -15 % de la population totale de pluviers siffleurs qui se chiffrait à 112 en 2001 (-15%). En

tout, 68 pluviers siffleurs, soit 72 % de la population de la province, ont été recensés à l'extérieur du parc national et 27, soit 28 % de la population, ont été recensés à l'intérieur du parc.

Les mesures de protection du pluvier à l'extérieur du parc national se sont poursuivies; des panneaux et des clôtures symboliques ont été érigés autour des aires de nidification, sauf sur les îles côtières difficiles d'accès. Des bénévoles et des membres du personnel se chargent de surveiller régulièrement la population tout au long de la saison. On utilise des exclos de prédateurs lorsqu'il est possible de les vérifier fréquemment. Les tentatives de nidification et la productivité sont surveillées à chaque nid, sauf à ceux situés sur certaines îles côtières. Les mesures de protection demeurent importantes à l'intérieur du parc national : fermeture de certaines zones, application de la loi, formation, surveillance quotidienne, exclos de prédateurs et protection juridique grâce à la désignation de parc national.

### Introduction

Piping Plover (*Charadrius melodus melodus*) numbers and productivity were recorded opportunistically and, in some years, for portions of Prince Edward Island (PEI) from 1964 to 1990. More complete census and productivity information is available for most beaches in PEI National Park (PEINP) since 1977. Four international censuses have now been completed in 1991, 1996, 2001, and 2006, providing information on the entire provincial population (Cairns 1978; Johnson and Feldstein 1983; MacLeod 1984; Northcott and Creamer 1987; Flemming 1992; McAskill et al. 1994; Walker and Waddell, 1996; Waddell 2005, and MacDonald *In prep.*).

Each year since 1996, monitoring efforts included an annual 'mini-census' on beaches with a history of plover use or with suitable plover habitat across the province. These "mini-censuses" were conducted in 1994 and annually from 1997 to 2005. Protection and monitoring of plovers has improved to include all nesting beaches outside PEINP and the number of beaches censused in 1996, 2001 and 2006 has continually increased. Protection measures implemented annually on all active plover beaches include placement of signs, symbolic fencing, monitoring and protection by staff and volunteers, and predator exclosures where they can be checked regularly.

This paper summarizes the results of the fourth International Piping Plover Breeding Census in PEI in 2006 and includes some updated information on conservation efforts in the province.

### Methods

A list of beaches to be censused on PEI was compiled using the 2001 International Census and comparing with annual mini-census sites. The sites surveyed in 2001 adequately cover all

known suitable habitat, therefore no new sites were identified. Sally's Beach was added to the list of sites, but this beach had been surveyed as part of Spry Cove in the past. Two beaches surveyed in previous censuses were not censused in 2006 as no suitable habitat was present. Three other beaches were checked and removed from the list as these were also unsuitable. Therefore, in 2006, 86 beaches (Figure 1) were selected to be censused.

The dates of the census were selected as June 3 to June 16. Volunteers were recruited from previous censuses and staff of the Island Nature Trust. The census inside PEINP was conducted exclusively by PEINP staff. Volunteers and staff used the same census guidelines throughout the province and were consistent with the established protocols. Staff of the Nature Trust assisted volunteers in difficult sites where large areas of habitat required four to five surveyors to get accurate results. Volunteers were provided with international census forms, maps, identification materials and guidelines such as dates, census techniques, weather limits to the census, tips for identification of plovers, tracking, safety, access and equipment required to complete the census.

All beaches were accessed by foot, except for off-shore island beaches. Conway, Cascumpec, and Hog islands were accessed by motorboat. A canoe was used to access the Indian Point Sandhills. The census of Piping Plover habitat on these island beaches was then completed by foot.

### Results

The PEI portion of the 2006 International Piping Plover Breeding Census was completed from 1-16 June. A total of 86 beaches (Table 1) were surveyed: 74 beaches outside PEINP and 12 inside the park. A total of 201.15 km was censused, compared to 188 km in the 2001 International Census and 180 km in the 1996 International Census. Ninety-five adult Piping Plovers were counted on 24 beaches surveyed throughout the province. These consisted of 45 pairs and five singles. Although 44 pairs and five singles were actually counted during the census window, one pair observed during the detectability study was included in the census results because the nest hatched three weeks after the survey window and therefore the pair was deemed to have been present during the census. Two beaches, Cape Traverse and Tryon River surveyed in 1996 and 2001 were not censused in 2006 as the habitat there was considered unsuitable. Three other beaches were checked and removed from the census due to lack of habitat. These sites were Barachois Run, Grande Digue Point, and Higgins Wharf.

Several areas were identified as being particularly important for Piping Plovers. These sites included Cavendish Sandspit (10 birds), Conway Island (8 birds), North Rustico Sandbar (8 birds), and St. Peter's Harbour (8 birds).

No adverse weather conditions were reported for the census period which may have affected census results, destroyed Piping Plover nests or altered habitat. Censusers recorded weather conditions during most surveys within the guideline parameters. The one exception was a survey of Cascumpec Island, where the entire island had been intended to be surveyed (approximately 6 km) but the west end of the island could not be accessed by boat due to fog. The east end of the island was however accessed where less fog was present. A total of 1.5 km of the island was censused.

Disturbances were reported on most sites. Disturbance included human activities, vehicles on the beach, dogs and the presence of crows (*Corvus brachyrhynchos*), and gulls (*Larus* spp.). Vehicles were observed on two beaches: Fortune Beach and Round Pond. Vehicle tracks were also documented on 21 additional beaches: Basin Head, Campbell's Cove, Cross River, East Lake, East Point, Naufrage, North Lake, Priest Pond, St. Margaret's, South Lake, Black Pond West, Cedar Dunes Park, Cedar Dunes West, Foley's Pond, Jacques Cartier, Little Miminegash, Maximeville, Miminegash Pond, Morrison's Pond, Nail Pond, and Tignish Shore.

### Discussion

Ninety-five adult Piping Plovers were reported for PEI in the 2006 International Piping Plover Breeding Census. These census results represent a decrease (-15%) in the provincial population over the 2001 population estimate of 112 adults and an increase (+44%) from the 1996 estimate of 66 adults. A reduction in the number of sites occupied was also noted in 2006, with plovers nesting at 24 beaches this year, compared to 28 beaches in 2001. One hundred and ten (110) plovers were found on 20 beaches in 1991, 66 birds on 19 beaches in 1996, 112 birds on 28 beaches in 2001 and 95 birds on 24 beaches in 2006.

Of the 24 beaches where plovers were recorded in 2006, 21 were occupied in 2001. Plovers were recorded for the first time in an International Census on three beaches: Panmure Island, Cavendish Campground and Tracadie Sandbar. Seven beaches with plovers in the 2001 census had no plovers in 2006: Greenwich, Old Ferry Spit, Poverty Beach, Savage Harbour, Souris Causeway, Cabot Provincial Park, and Cousin's Pond. Three of these beaches (Greenwich, Old Ferry Spit and Souris Causeway) had nesting plovers in 2006, but outside the census period. A pair was also observed scraping at Cabot Provincial Park but eventually nested at Darnley Point. Habitat remains suitable at the three other beaches (Poverty Beach, Savage Harbour and Cousin's Pond) and

therefore likely to be used by plovers in future years (See Table 2 for comparison of results of the four International Censuses. Only beaches with plovers observed are listed).

Fourteen plovers were found on the extensive Hog Islands chain (Cascumpec, Conway and Hog islands). A complete survey of the three islands was planned but, due to fog near Alberton, surveyors were unable to reach the west end of Cascumpec Island. The west end of this island has not been checked in years due to its lack of suitable habitat and is unlikely to be used by plovers. It will be surveyed in future years due to the likelihood that the habitat may once again become suitable. The east end of Cascumpec, all of Conway and Hog Island were surveyed. Conway Island has broken into three separate islands. In 1991, the entire length of the three islands was surveyed. Since that time, the distance was reduced to include only areas with prime plover habitat: essentially the ends of each island and a large wash-over on one island. During the 2006 census, three pairs of plovers were found in areas that would not have been normally checked since 1991. These areas will be checked in future years.

The Island Nature Trust produced its first edition of an atlas of all Piping Plover beaches in the province in 1997 (Island Nature Trust 1997). This atlas contains important beach specific information (location, traditional use and conservation approaches applied) and historical nesting records for plovers. The atlas is updated annually to include all new survey information including nesting attempts, eggs laid, chicks hatched and fledged on a beach-by-beach basis (MacDonald and Waddell 2006).

Disturbance is an ongoing challenge to nesting plovers. Human-induced factors are particularly problematic, and include pedestrians, vehicles, as well as loose dogs and other domestic animals. Enforcement of existing legislation is often difficult on beaches outside PEINP. Factors continuing to affect population numbers include predation of adults, eggs and chicks, weather and human disturbance.

Piping Plovers in PEI have received better protection in their nesting areas across the province since the 1996 International Census. Protection and monitoring efforts are continually improved. With a continued focus on tourism in the province, support must be maintained to ensure that the Piping Plover remains protected during the nesting season to offset the potential negative impacts of human disturbance.

### **Acknowledgements**

The 2006 International Piping Plover Breeding Census was supported by generous financial and volunteer contributions: Environment Canada's Habitat Stewardship Program for Species at Risk, World Wildlife Fund and Environment Canada's Endangered Species Recovery Fund, the Canadian Wildlife Service, the Province of Prince Edward Island, Island Nature Trust, Parks Canada Agency - Prince Edward Island National Park of Canada including the Piping Plover monitors and protection staff of PEINP, over 20 volunteer census participants across PEI; and the beach-going public who respect protection efforts to reduce disturbance to Piping Plovers in Prince Edward Island are appreciated for their assistance, generosity, and efforts promoting species recovery.



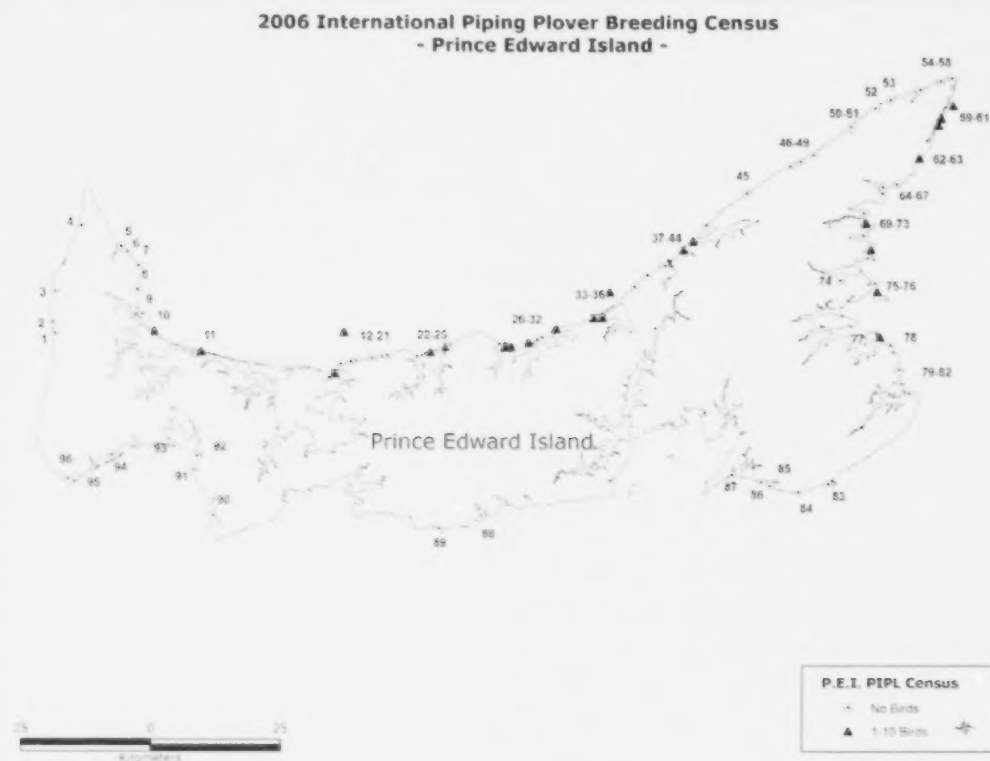


Figure 1. Location of sites censused on Prince Edward Island during the 2006 International Piping Plover Breeding Census.

# 2006 Piping Plover Census

Table 1. 2006 International Piping Plover Breeding Census in Prince Edward Island.

Map no	Site name	County	1:50,000 NTS <sup>1</sup> map sheet	Latitude ("N)	Longitude ("W)	2006 census							Surveyed in 2006 census	Surveyed in 2001 census	Surveyed in 1996 census	Surveyed in 1991 census
						Date	No. of pairs	No. of singles	No. of adults	Km surveyed	No. of surveyors	No. of hours				
61	Basin Head	Kings	11 K/5, 11 L/8	46°23'57"	62°04'18"	9 June	1	0	2	3.5	2	1.3	yes	yes	yes	yes
82	Beach Point	Kings	11 L/1	46°01'14"	62°28'36"	15 June	0	0	0	0.8	2	0.25	yes	yes	yes	yes
62	Black Pond	Kings	11 K/5, 11 L/8	46°22'00"	62°09'17"	9 June	2	1	5	2.25	2	1	yes	yes	yes	no
63	Black Pond* <sup>2</sup>	Kings	11 K/5, 11 L/8	46°22'00"	62°09'17"	14 June	2	0	4	2.25	2	1	yes	yes	yes	no
76	Boughton Island	Kings	11 L/1	46°12'10"	62°24'58"	9 June	1	0	2	3.5	2	0.5	yes	yes	yes	yes
45	Cable Head	Kings	11 L/1	46°28'06"	62°34'09"	9 June	0	0	0	0.75	2	0.3	yes	yes	yes	yes
53	Campbell's Cove	Kings	11 K/5	46°28'49"	62°08'28"	7 June	0	0	0	1	1	0.3	yes	yes	no	no
39	Canavoy	Kings	11 L/7	46°25'58"	62°49'31"	7 June	1	1	3	3.5	1	1	yes	yes	yes	yes
79	Condon's Pond	Kings	11 L/2	46°03'55"	62°28'03"	16 June	0	0	0	2.2	1	1	yes	yes	no	no
46	Cow River	Kings	11 K/5, 11 L/8	46°28'12"	62°26'34"	9 June	0	0	0	0.25	1	0.1	yes	yes	no	yes
51	Cross River	Kings	11 K/5, 11 L/8	46°28'31"	62°15'42"	7 June	0	0	0	0.5	1	0.25	yes	yes	yes	yes
50	Cross River*	Kings	11 K/5, 11 L/8	46°28'31"	62°15'42"	13 June	0	0	0	0.5	1	0.25	yes	yes	yes	yes
36	Diligent Pond	Kings	11 K/5, 11 L/8	46°26'25"	62°59'20"	9 June	1	0	2	1.25	2	0.75	yes	yes	yes	yes
57	East Lake	Kings	11 K/5, 11 L/8	46°27'47"	62°00'36"	7 June	0	0	0	2	1	1	yes	yes	yes	yes
56	East Lake*	Kings	11 K/5, 11 L/8	46°27'47"	62°00'36"	13 June	0	0	0	2	1	1	yes	yes	yes	yes
58	East Point	Kings	11 K/5, 11 L/8	46°27'26"	61°58'56"	7 June	0	0	0	1	1	0.5	yes	yes	yes	no
70	Eglinton Cove	Kings	11 K/5, 11 L/8	46°18'58"	62°21'09"	9 June	2	1	5	1	2	1	yes	yes	yes	yes
69	Eglinton Cove *	Kings	11 K/5, 11 L/8	46°18'58"	62°21'09"	14 June	2	1	5	1	2	1	yes	yes	yes	yes
68	Fortune Beach	Kings	11 K/5, 11 L/8	46°20'02"	62°20'40"	9 June	0	0	0	1	2	0.3	yes	yes	no	no
80	Graham's Pond	Kings	11 L/2	46°03'55"	62°28'03"	1 June	0	0	0	0.8	2	0.5	yes	yes	no	no
44	Greenwich/ Schooner PEINP <sup>1</sup>	Kings	11 L/7	46°27'19"	62°41'46"	15 June	0	0	0	6	1	3	yes	yes	no	no

# 2006 Piping Plover Census

Table 1 (cont'd) 2006 International Piping Plover Breeding Census in Prince Edward Island.

Map no	Site name	County	1:50,000 NTS <sup>1</sup> map sheet	Latitude (°N)	Longitude (°W)	2006 census							Surveyed in 2006 census	Surveyed in 2001 census	Surveyed in 1996 census	Surveyed in 1991 census
						Date	No. of pairs	No. of singles	No. of adults	Km surveyed	No. of surveyors	No. of hours				
71	Howe Bay	Kings	11 K/5, 11 L/8	46°17'58"	62°22'24"	9 June	0	0	0	1.5	2	0.5	yes	yes	yes	yes
42	Lake Run (St. Peter's)	Kings	11 L/7	46°26'21"	62°46'38"	7 June	1	1	3	1.5	2	1	yes	yes	yes	yes
75	Launching Point	Kings	11 L/1	46°13'03"	62°24'38"	9 June	0	0	0	1	2	0.25	yes	yes	yes	yes
47	Naufrage	Kings	11 K/5, 11 L/8	46°28'05"	62°24'50"	7 June	0	0	0	1	1	0.5	yes	yes	yes	yes
65	Norris Pond	Kings	11 K/5, 11 L/8	46°20'49"	62°14'10"	9 June	0	0	0	0.5	2	0.2	yes	yes	no	no
64	Norris Pond*	Kings	11 K/5, 11 L/8	46°20'49"	62°14'10"	14 June	0	0	0	0.5	1	0.2	yes	yes	no	No
54	North Lake	Kings	11 K/5, 11 L/8	46°28'05"	62°03'54"	7 June	0	0	0	0.8	1	0.75	yes	yes	yes	Yes
55	North Lake*	Kings	11 K/5, 11 L/8	46°28'05"	62°03'54"	13 June	0	0	0	0.8	1	1	yes	yes	yes	Yes
74	Old Ferry Spit	Kings	11 L/1	46°15'11"	62°28'49"	9 June	0	0	0	1.5	2	0.5	yes	yes	yes	Yes
77	Panmure Island	Kings	11 L/1	46°07'57"	62°28'03"	6 June	1	0	2	2.5	1	1	yes	yes	yes	Yes
40	Pigot's Pond	Kings	11 L/7	46°26'01"	62°50'31"	7 June	0	0	0	0.8	1	0.3	yes	yes	no	No
81	Poverty Beach	Kings	11 L/7	46°02'29"	62°28'49"	15 June	0	0	0	1.2	2	0.5	yes	yes	yes	Yes
52	Priest Pond	Kings	11 K/5, 11 L/8	46°28'52"	62°11'10"	7 June	0	0	0	0.8	1	0.3	yes	yes	yes	Yes
48	Saint Margaret's	Kings	11 K/5, 11 L/8	46°28'03"	62°22'43"	7 June	0	0	0	1	1	0.2	yes	yes	yes	yes
49	Saint Margaret's*	Kings	11 K/5, 11 L/8	46°28'03"	62°22'43"	13 June	0	0	0	1	1	0.25	yes	yes	yes	yes
43	Saint Peter's Harbour	Kings	11 L/7	46°26'36"	62°44'43"	12 June	4	0	8	2.5	3	1.5	yes	yes	yes	yes
73	Sally's Beach	Kings	11 K/5, 11 L/8	46°15'43"	62°23'38"	9 June	0	0	0	1	2	unk. <sup>1</sup>	yes	yes	yes	yes
41	Savage Harbour West	Kings	11 L/7	46°25'51"	62°50'05"	7 June	0	0	0	0.25	1	0.2	yes	yes	yes	yes

# 2006 Piping Plover Census

Table 1 (cont'd). 2006 International Piping Plover Breeding Census in Prince Edward Island

Map no	Site name	County	1:50,000 NTS <sup>1</sup> map sheet	Latitude (°N)	Longitude (°W)	2006 census										
						Date	No. of pairs	No. of singles	No. of adults	Km surveyed	No. of surveyors	No. of hours	Surveyed in 2006 census	Surveyed in 2001 census	Surveyed in 1996 census	Surveyed in 1991 census
67	Sheep Pond	Kings	11 K/5, 11 L/8	46°20'46"	62°16'45"	9 June	0	0	0	0.75	2	0.2	yes	yes	no	no
66	Souris Causeway	Kings	11 K/5, 11 L/8	46°21'20"	62°16'14"	9 June	0	0	0	1	1	0.3	yes	yes	yes	yes
60	South Lake	Kings	11 K/5, 11 L/8	46°24'23"	62°03'26"	6 June	2	0	4	5	1	3.5	yes	yes	yes	
72	Spry Cove	Kings	11 K/5, 11 L/8	46°16'21"	62°22'32"	9 June	1	0	2	2.5	2	1.25	yes	yes	yes	
78	Steeles Pond	Kings	11 L/2	46°06'35"	62°27'19"	6 June	0	0	0	0.8	1	0.3	yes	yes	no	no
91	Barachois Run	Prince	21 I/9	46°31'50"	64°06'20"	15 June	n.s.	n.s.	n.s.	0	1	n.s.	no	yes	yes	yes
3	Black Pond West	Prince	11 L/13, 21 I/16	46°55'26"	64°11'34"	13 June	0	0	0	1	1	0.5	yes	yes	yes	no
12	Cabot Provincial Park	Prince	11 L/12	46°33'28"	63°41'19"	6 June	0	0	0	1.5	3	0.2	yes	yes	yes	yes
89	Cape Traverse	Prince	11 L/4	46°13'53"	63°39'01"		n.s.	n.s.	n.s.	0	0	n.s.	no	yes	yes	yes
10	Casumpec Island	Prince	11 L/13, 21 I/16	46°46'39"	64°01'22"	13 June	1	0	2	1.5	2	1	yes	yes	yes	yes
95	Cedar Dunes Park	Prince	21 I/9	46°36'55"	64°22'53"	15 June	0	0	0	1	1	0.25	yes	yes	yes	yes
96	Cedar Dunes West	Prince	21 I/9	46°37'33"	64°23'30"	15 June	0	0	0	2	1	0.5	yes	yes	yes	yes
11	Conway Island	Prince	11 L/12	46°42'22"	63°56'43"	13 June	4	0	8	12	2	2.5	yes	yes	yes	yes
13	Darnley Point	Prince	11 L/12	46°33'29"	63°40'59"	6 June	3	0	6	2	4	0.5	yes	yes	yes	yes
8	Foley's Pond (The Gap)	Prince	11 L/13, 21 I/16	46°51'20"	64°00'29"	11 June	0	0	0	2	1	0.5	yes	yes	yes	no
92	Higgins Wharf	Prince	21 I/9	46°33'04"	64°04'55"	15 June	n.s.	n.s.	n.s.	0	0	n.s.	no	yes	no	no
21	Hog Island	Prince	11 L/12	46°36'45"	63°36'45"	13 June	2	0	4	11	2	4	yes	yes	yes	yes
94	Indian Point Sandhills	Prince	21 I/9	46°37'31"	64°16'01"	15 June	0	0	0	7	2	3.25	yes	yes	yes	yes
9	Jacques Cartier East	Prince	11 L/13, 21 I/16	46°48'53"	64°01'44"	11 June	0	0	0	6	1	3	yes	yes	yes	yes
7	Kildare Capes	Prince	11 L/13, 21 I/16	46°53'30"	63°58'34"	11 June	0	0	0	3	1	0.5	yes	yes	yes	yes
1	Little Miminegash	Prince	11 L/13, 21 I/16	46°51'33"	64°14'36"	13 June	0	0	0	1.5	1	0.4	yes	yes	yes	no

# 2006 Piping Plover Census

Table 1 (cont'd) 2006 International Piping Plover Breeding Census in Prince Edward Island

Map no	Site name	County	1:50,000 NTS/ map sheet	Latitude (°N)	Longitude (°W)	Date	2006 census									
							No. of pairs	No. of singles	No. of adults	Km surveyed	No. of surveyors	No. of hours	Surveyed in 2006 census	Surveyed in 2001 census	Surveyed in 1996 census	Surveyed in 1991 census
90	Maximeville	Prince	21 I/8	46°26'41"	64°07'09"	15 June	0	0	0	2	2	0.5	yes	yes	yes	no
2	Mimnegash Pond	Prince	11 L/13, 21 I/16	46°52'41"	64°14'02"	13 June	0	0	0	1	1	0.25	yes	yes	yes	yes
14	Morrison's Pond	Prince	11 L/12	46°33'40"	63°38'06"	10 June	0	0	0	3	1	1	yes	yes	yes	no
4	Nail Pond	Prince	21 P/1, 11 M/4, 11 L/13, 21 I/16	47°00'07"	64°03'13"	13 June	0	0	0	2.5	1	1	yes	yes	yes	no
15	Profitt's Point	Prince	11 L/12	46°33'59"	63°39'32"	unk	0	0	0	0.5	1	unk	yes	yes	yes	no
6	Round Pond	Prince	11 L/13, 21 I/16	46°55'24"	63°59'02"	11 June	0	0	0	2.5	1	1	yes	yes	yes	no
5	Tignish Shore	Prince	11 L/13, 21 I/16	46°56'08"	63°59'27"	11 June	0	0	0	1	1	0.5	yes	yes	yes	no
16	Adam's Cottages	Queens	11 L/12	46°33'33"	63°37'20"	10 June	0	0	0	2	1	0.5	yes	yes	no	no
17	Adam's Pond	Queens	11 L/12	46°32'55"	63°35'07"	10 June	0	0	0	1	1	0.5	yes	yes	yes	no
84	Bell Point	Queens	11 L/15	45°58'11"	62°50'10"	5 June	0	0	0	1.5	1	0.25	yes	yes	yes	yes
59	Blooming Point	Queens	11 L/7, 11 L/6	46°24'56"	62°00'56"	15 June	3	0	6	7.5	1	4	yes	yes	yes	yes
30	Brackley Man	Queens	11 L/6	46°25'52"	63°12'13"	14 June	0	0	0	1.2	1	0.25	yes	yes	yes	yes

# 2006 Piping Plover Census

Table 1 (cont'd) 2006 International Piping Plover Breeding Census (Prince Edward Island)

Map no	Site name	County	1:50,000 NTS <sup>1</sup> map sheet	Latitude ("N)	Longitude ("W)	2006 census							Surveyed in 2006 census	Surveyed in 2001 census	Surveyed in 1996 census	Surveyed in 1991 census
						Date	No. of pairs	No. of singles	No. of adults	Km surveyed	No. of surveyors	No. of hours				
18	Brandor's Pond	Queens	11 L/12	46°32'55"	63°35'07"	10 June	0	0	0	2	1	0.3	yes	yes	yes	no
19	Campbells Pond	Queens	11 L/12	46°32'19"	63°32'50"	10 June	0	0	0	1.5	1	0.5	yes	yes	yes	no
24	Cavendish Campground Beach	Queens	11 L/6	46°30'08"	63°24'43"	14 June	1	0	2	1.1	2	1	yes	yes	yes	no
25	Cavendish Main	Queens	11 L/6	46°30'03"	63°23'56"	14 June	0	0	0	1.1	2	0.5	yes	yes	yes	no
23	Cavendish Sandspit	Queens	11 L/6	46°30'26"	63°27'05"	14 June	5	0	10	10	2	4.4	yes	yes	yes	yes
20	Cousin's Pond	Queens	11 L/12	46°32'30"	63°33'33"	15 June	0	0	0	0.5	1	unk	yes	yes	yes	yes
32	Covehead Harbour W.	Queens	11 L/6	46°25'52"	63°08'59"	14 June	1	0	2	3.5	1	1	yes	yes	yes	yes
37	Deroche Pond	Queens	11 L/7	46°25'33"	62°55'41"	16 June	0	0	0	5	1	2	yes	yes	yes	yes
38	Feehan's Point	Queens	11 L/7	46°25'55"	62°53'08"	11 June	0	0	0	2	2	0.5	yes	yes	no	no
85	Gascome Cove East	Queens	11 L/2	46°00'17"	62°53'19"	5 June	0	0	0	1	2	0.25	yes	yes	yes	yes
86	Gascome Cove West	Queens	11 L/2	46°01'05"	62°54'07"	5 June	0	0	0	2	2	0.5	yes	yes	yes	yes
26	North Rustico Beach	Queens	11 L/6	46°27'30"	63°17'30"	14 June	0	0	0	1	1	unk	yes	yes	yes	yes
27	North Rustico Sandbar	Queens	11 L/6	46°26'56"	63°17'05"	6 June	4	0	8	3	5	1	yes	yes	yes	yes
87	Pond Point	Queens	11 L/2	46°03'16"	62°57'19"	5 June	0	0	0	1	1	0.25	yes	yes	no	yes
28	Robinson's Is. Sandspit	Queens	11 L/6	46°26'39"	63°16'13"	14 June	1	0	2	1.2	1	1	yes	yes	yes	yes
29	Rustico Causeway	Queens	11 L/6	46°26'03"	63°13'36"	14 June	1	0	2	2.3	1	0.5	yes	yes	yes	yes
31	Shaw's Beach	Queens	11 L/6	46°25'49"	63°11'30"	14 June	0	0	0	1.2	1	1	yes	yes	yes	yes

# 2006 Piping Plover Census

Table 1 (cont'd): 2006 International Piping Plover Breeding Census in Prince Edward Island

Map no	Site name	County	1:50,000 NTS <sup>1</sup> map sheet	Latitude ("N)	Longitude ("W)	Date	2006 census						Surveyed in 2006 census	Surveyed in 2001 census	Surveyed in 1996 census	Surveyed in 1991 census
							No. of pairs	No. of singles	No. of adults	Km surveyed	No. of surveyors	No. of hours				
33	Tracadie Beach to Covehead Harbour	Queens	11 L/6	46°24'56"	63°03'21"	14 June	1	1	3	8.8	1	3	yes	yes	yes	yes
34	Tracadie Sandbar	Queens	11 L/6	46°24'30"	63°02'14"	9 June	0	0	0	2	1	2.25	yes	yes	yes	yes
35	Tracadie Sandbar*	Queens	11 L/6	46°24'30"	63°02'14"	16 June	1	0	2	2	2	1.25	yes	yes	yes	yes
88	Tryon River	Queens	11 L/4	46°12'46"	63°32'34"	n.s.	n.s.	n.s.	n.s.	0	0	n.s.	no	yes	yes	no
83	Wood Islands	Queens	11 E/15	45°57'20"	62°45'44"	5 June	0	0	0	3	2	0.5	yes	yes	yes	yes
22	Yankee Beach	Queens	11 L/12	46°30'42"	63°29'08"	14 June	0	0	0	1.5	1	0.3	yes	yes	yes	no
Totals (86 beaches)							45	5	95	201.15		79.85				

<sup>1</sup> NTS = National Topographic Maps

<sup>2</sup> \* = Double-sample sites

<sup>3</sup> PEINP = Prince Edward Island National Park

<sup>4</sup> unk. = unknown

<sup>5</sup> n.s. = not surveyed



Table 2. Numbers of Piping Plovers observed in each International Piping Plover Breeding Census in Prince Edward Island.

Beach name	County	2006 census	2001 census	1996 census	1991 census
Basin Head	Kings	2	4	0	0
Black Pond	Kings	5	2	0	n.s. <sup>1</sup>
Boughton Island	Kings	2	2	0	0
Canavoy	Kings	3	13	9	11
Diligent Pond	Kings	2	3	0	1
East Lake	Kings	0	0	1	0
Eglington Cove	Kings	5	2	0	2
Greenwich Schooner	Kings	0	2	0	6
Howe Bay	Kings	0	0	0	2
Lake Run (St. Peter's)	Kings	3	2	2	2
Naufrage	Kings	0	0	0	2
Old Ferry Spit	Kings	0	2	0	0
Panmure Island	Kings	2	0	0	0
Poverty Beach	Kings	0	2	0	0
St. Peter's Harbour	Kings	8	4	0	0
Savage Harbour West	Kings	0	2	0	2
Souris Causeway	Kings	0	3	0	0
South Lake	Kings	4	2	1	2
Spry Cove	Kings	2	1	0	0
Sub-total for Kings Co.	Kings	38	46	13	30
Cabot Provincial Park	Prince	0	2	3	4
Cascumpec Island	Prince	2	5	0	0
Conway Island	Prince	8	5	2	8
Darnley Point	Prince	6	1	2	3

Table 2 (cont'd). Numbers of Piping Plovers observed in each International Piping Plover

## Breeding Census in Prince Edward Island.

Beach	County	2006 census	2001 census	1996 census	1991 census
Hog Island	Prince	4	4	4	11
Jacques Cartier East	Prince	0	0	2	5
Nail Pond	Prince	0	0	1	1
Sub-total for Prince Co.	Prince	20	17	14	32
Blooming Point	Queens	6	5	1	16
Campbells Pond	Queens	0	0	2	n.s.
Cavendish Campground Beach	Queens	2	0	0	n.s.
Cavendish Sandspit	Queens	10	13	10	20
Cousin's Pond	Queens	0	2	2	2
Covehead Harbour West	Queens	2	9	10	4
North Rustico Sandbar	Queens	8	13	4	n.s.
Robinson's Island Sandspit	Queens	2	2	2	0
Rustico Causeway	Queens	2	4	6	6
Tracadie Beach to Covehead Harbour	Queens	3	1	0	0
Tracadie Sandbar	Queens	2	0	0	0
Tryon River	Queens	n.s.	0	1	0
Sub-total for Queens Co.	Queens	37	49	38	48
Totals (39 beaches)		95	112	65	110

n.s. = no survey.

## The 2006 Piping Plover Census in New Brunswick

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### Abstract

The 2006 International Piping Plover Census in New Brunswick was held from 3-16 June. During the census, 167 adults, including 74 pairs and 19 singles, were counted on 26 of 61 beaches surveyed. This represents the same adult population estimate as in 2001, suggesting a stable population and a considerable increase (+14%) from 1996. Compared to 1991 census results, the population has decreased by -18%. Piping Plover conservation programs in New Brunswick monitored 70 breeding pairs to gather population productivity data in 2006. A total of 136 chicks were fledged for a productivity rate of 1.94 chicks fledged per pair. Disturbance on breeding grounds caused by All Terrain Vehicle users and recreational beach users, chick and egg depredation and nest flooding continue to limit the Piping Plover population in New Brunswick. Since the 2001 census, conservation efforts such as habitat protection, education and stewardship have been ongoing in the province.

### Résumé

Le recensement international du Pluvier siffleur de 2006 au Nouveau-Brunswick s'est déroulé du 3 au 16 juin. Au cours de ce recensement, on a dénombré 167 adultes, dont 74 couples et 19 individus, sur 26 des 61 plages ayant fait l'objet d'observations. Il s'agit du même nombre de pluviers par rapport au recensement de 2001, indiquant une population stable entre ces années et une hausse importante (+14 %) par rapport à celui de 1996. Cependant, la population a diminué de -18 % par rapport au recensement de 1991. Dans le cadre des programmes de protection du Pluvier siffleur au Nouveau-Brunswick, on a observé 70 couples reproducteurs pour recueillir des données sur le taux de productivité de la population en 2006. Au total, 136 oisillons ont survécu jusqu'à l'envol, ce qui représente un taux de productivité de 1,94 oisillon par couple. La perturbation des aires de reproduction causée par les véhicules tout-terrain (VTT) et par la présence humaine sur les plages, la déprédation des oisillons et des œufs et l'inondation des nids continuent à limiter la population de Pluviers siffleur au Nouveau-Brunswick. Depuis le recensement de 2001, des activités de protection de l'habitat naturel, de sensibilisation et de bonne intendance ont lieu dans la province.

### Introduction

Approximately 36% of the eastern Canada Piping Plover (*Charadrius melodus melodus*) population nests on the wide barrier beaches and islands along the eastern coast of New Brunswick. Major threats to Piping Plovers in New Brunswick include All Terrain Vehicle (ATV) traffic, coastal development resulting in habitat loss, human disturbance and depredation.

Conservation programs for the Piping Plover began in New Brunswick in 1982, when Kouchibouguac National Park of Canada (KNP) initiated a monitoring program. The Piper Project was established in 1986 and encompasses the Acadian Peninsula in northeastern New Brunswick, where the largest concentration of Piping Plovers in the province is found. The Irving Eco-Centre - la Dune de Bouctouche began monitoring beaches in southeastern New Brunswick in 1999. All Piping Plover habitat in New Brunswick is now monitored annually through these conservation programs.

All conservation programs are based on the detailed information collected during annual monitoring efforts, and placed within a broader context with results of the five-year international census. Piping Plover conservation programs have various components, including: public outreach and education, monitoring to gather annual population and productivity data and the use of management techniques designed to increase reproductive success such as public education, signs, symbolic fencing zones, predator exclosures and beach closures (exclusively in national parks and occasionally at the Irving Eco-Centre - la Dune de Bouctouche).

The Canadian Wildlife Service (CWS) coordinated the fourth International Piping Plover Census in New Brunswick. This report details the findings of the census and the outcome of the monitoring programs from the Piper Project, KNP and the Irving Eco-Centre - la Dune de Bouctouche.

### Methods

All known potential Piping Plover habitat was identified in New Brunswick. To select sites, the suitability of all census beaches surveyed in 1991, 1996 and 2001 was assessed. Piping Plover conservation organizations in New Brunswick provide input on an annual basis regarding the suitability of beach habitat across the province, which facilitated site identification. Two new beaches, Miscou Centre (Miscou Island) and St-Marie St-Raphaël, were surveyed for the first time during an international census in 2006. Seven sites surveyed during the 2001 census were removed from the census as they were deemed unsuitable for nesting Piping Plovers due to habitat degradation caused by coastal erosion, beach succession or the presence of large gull colonies. For

these reasons, Crab Island, Egg Island, Huckleberry Island, "Little" Huckleberry Island, Sheldrake Island, Île Pokesudie and Neguac Spit "North" were not surveyed for breeding Piping Plovers. No unidentified suitable habitat was detected during the census and there is likely no remaining undiscovered potential habitat for Piping Plovers in New Brunswick.

The 2006 census took place from 3-16 June. Sixty-one beaches comprising 221 km of shoreline were covered during the census. The length of shoreline censused in 2006 was slightly less than the 302.5 km surveyed during the 2001 census. Four sites selected for inclusion in the detectability study were surveyed twice during the census window. All surveys were conducted in ideal weather conditions with little or no precipitation and light to moderate winds despite several days of high winds and inclement weather during a portion of the census window. All suitable habitats were surveyed during the census window with the exception of South Richibucto, "North Barrier Island."

### Results

One hundred and sixty-seven Piping Plovers, consisting of 74 pairs and 19 singles, were estimated to have been present on 26 of the 61 beaches surveyed in New Brunswick in 2006 (Figure 1, Table 1). During the census window, 166 adults had been observed (73 pairs and 20 singles), however the total number reported for the census was adjusted slightly to account for information obtained in a subsequent site visit. A single adult was seen on a nest at Escuminac Beach during the census; however in subsequent visits two adults were seen together at the nest. Because the beach is remote, there is little likelihood that the adult would have been counted while foraging on a nearby beach. The 61 sites surveyed were distributed among five counties: Albert (1), Gloucester (27), Kent (14), Northumberland (9) and Westmorland (10). Seven sites surveyed were reported to have little suitable habitat and it was recommended that they be removed from future censuses. These sites were: Cap Bateau, Chiasson Office, St-Marie St-Raphaël (Gloucester County), and Landry "East," Little Cape, Petit Barachois, Shediac Island (Westmorland County). The New Brunswick Piping Plover population is distributed across three counties: Gloucester ( $n=55$ , 33%), Kent ( $n=61$ , 36.5%), and Northumberland ( $n=51$ , 30.5%) (Figure 1, Table 2).

Four beaches in New Brunswick were randomly selected to be included in a detectability study; each site was surveyed twice during the census period. These sites include: Cedar Road "Spit", Escuminac, Pointe Sapin Dune (KNP) and Quai de St. Édouard (Table 3). The survey results for Cedar Road "Spit" and Escuminac increased by two and three individuals respectively, during the second surveys. Two of the birds detected during the second survey at Escuminac were single birds and the third plover was part of a nesting pair that had not been seen during the first survey.

The plover that was part of the nesting pair was included in the survey results, as it was judged to have been missed during the first survey. The extra pair detected at Cedar Road "Spit" was in the early stages of nest initiation. Therefore, it is possible that some of the birds were not present on the beaches during the first surveys.

A total of 90 pairs and 91 nest attempts were recorded in New Brunswick during 2006. Piping Plover conservation programs across the province monitored the reproductive success of 70 breeding pairs (Table 4) in 2006 (80% of nesting pairs in the province). These pairs were monitored regularly throughout the summer until nest failure, chick loss, or chick fledgling (when chicks are 20 days of age or can sustain flight of >15 m). Of the 72 nests monitored (including two renests), 77.8% were successful (hatched at least one chick) and 22.2% were unsuccessful. A total of 136 young fledged this year, for a productivity rate of 1.94 chicks fledged per pair for the province. The remaining nests were not monitored for productivity data due to difficulties in accessing many sites and shortages of monitors.

Thirty-five surveyors participated in the census. The participants were affiliated with the following organizations: Canadian Wildlife Service (16), New Brunswick Department of Natural Resources (2), Piper Project (6), KNP (3), Irving Eco-Centre/ La Dune de Bouctouche (3), Cape Jourimain Nature Centre (1), Bird Studies Canada (1), and non-affiliated volunteers (3).

### Discussion

In New Brunswick, 167 adults (74 pairs and 19 singles) consisting of 36% of the Piping Plover population in eastern Canada were counted during the 2006 census. The population counts recorded during the census, were identical to the 2001 population estimate of 167 adults (79 pairs), and considerably higher (+14%) than the 1996 count of 146 adults (65 pairs). Compared to the 1991 census results when 203 adults (91 pairs) were counted, the Piping Plover population has experienced a -18% decline (Figure 2).

All known suitable habitat was surveyed during the census window with the exception of one site, South Richibucto ("North Barrier Island"), a site that consistently has had one to two breeding pairs per year. It is thought that at least one pair of Piping Plovers was present at this site during the census, as it was visited on 25 July and one pair was discovered with three chicks. Therefore, the census count for New Brunswick is thought to be a slight underestimate.

The number of occupied sites from the 1991-2006 censuses has remained relatively stable, ranging from 24-30 sites (Table 5). However, the distribution of Piping Plovers in the province has shifted slightly since 1991, when occupied beaches were detected in five counties. The proportion of Piping Plovers in Gloucester County increased from 44% to 57% between 1991 and 1996. Since



1996, the proportion of Piping Plovers in the county has steadily decreased to 36%. Conversely, the proportion of Piping Plovers in Kent and Northumberland counties increased since 1991 (from 26% in both counties) to 33% and 31%, respectively (Table 6). As a result, the proportion of Piping Plovers across the province is now almost equally distributed among Gloucester, Kent and Northumberland counties.

Compared to 1996 population levels, 13 sites increased and 13 sites decreased in Piping Plover numbers (Table 6). Since 2001, seven beaches were re-evaluated and found to be unsuitable and ten sites experienced increased use by Piping Plovers in 2006.

These changes in Piping Plover distribution could be related to habitat changes or a reflection of increased disturbance on beaches. Piping Plovers occupy dynamic coastal habitats that typically are in an early successional stage. Natural ecological processes such as beach erosion, sediment deposition, vegetation growth, ice scour and storm events continuously modify habitat parameters of Piping Plover breeding beaches in New Brunswick. As one site becomes unsuitable for nesting Piping Plovers through vegetation growth and beach stabilization, another may become suitable for the species through storm events, creating dune breaches or wash-over areas. Therefore, although a given beach may be currently suitable for breeding Piping Plovers, the dynamic nature of coastal ecosystems means that this situation could change. This may explain the shift in habitat use from year to year.

Increased human disturbance could explain the abandonment of Piping Plover breeding beaches that appear to have suitable breeding habitat. Boyne and Amirault (1999) found that abandoned Piping Plover beaches experienced high levels of human activity. Piping Plovers are known to react more to human presence than to other species (Flemming *et al.* 1988; Dundas 1995). The construction of a fish plant on a sand dune at St-Marie St-Raphaël has resulted in Piping Plovers abandoning the site. Throughout the province, the continued development of coastal property for cottages and tourist attractions may physically destroy suitable habitat and may also result in habitat degradation caused by increased levels of human disturbance.

On a positive note, a decrease in human activity in suitable nesting habitat has been shown to result in a rapid increase in use by Piping Plovers. In previous years, Escuminac beach had experienced a great deal of ATV traffic; however in recent years a breach formed preventing vehicle traffic from accessing remote sections of the beach, essentially enhancing available habitat. As a result, Piping Plover use of this site and nesting success has increased.

Although the use of ATVs is illegal on beaches in New Brunswick, their presence was noted at several sites during the census. Nineteen of 61 beaches surveyed had excessive levels of ATV traffic. Two cases were reported where ATV tracks were seen centimetres from active Piping Plover



nests. The apparent increase in ATV use on nesting beaches could be related to delays in release of funding for conservation programs in 2006, resulting in a later initiation of guardian program efforts in comparison with other years. The delay in educational efforts and signage as well as protection measures such as symbolic fencing on beaches may have played a role in these increased levels of disturbance. Other factors limiting Piping Plovers in New Brunswick include egg and chick depredation and nest flooding.

Habitat conservation is an important Piping Plover recovery initiative. Ongoing efforts to protect important coastal ecosystems are contributing positively to recovery programs. The New Brunswick Coastal Areas Protection Policy was developed in 2002. This policy outlines standards and requirements for new coastal development proposals, with the aim of protecting coastal habitats. In addition to this new policy, land acquisition for conservation purposes has continued. The Nature Conservancy of Canada (NCC) has acquired important Piping Plover beaches in New Brunswick, such as the Tabusintac Dune (2005). In 2006, this site had 12 breeding pairs of Piping Plover, and experienced a productivity rate of 2.33 chicks fledged per pair. Property on Pointe à Bouleau, an Important Bird Area in Gloucester County, was also purchased by the NCC in 2003. These initiatives ensure that important nesting areas will remain free of development.

One of the most effective methods of conserving Piping Plovers in New Brunswick continues to be through education and stewardship. Piping Plover conservation programs throughout the province use various educational and public outreach initiatives such as: signage near nesting sites, newspaper articles, public presentations, displays at interpretation centres and radio interviews; implementing beach closures (Parks Canada); and installing symbolic fencing and exclosures around nest sites.

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Figure 1. Location of sites censused in New Brunswick during the 2006 International Piping Plover Breeding Census.

## 2006 Piping Plover Census

Table 1. Results of 2006 International Piping Plover Breeding Census in New Brunswick.

Map no.	Site name	County	1:50,000 NTS <sup>1</sup> map sheet	2006 census						Surveyed in 1991 census	Surveyed in 1996 census	Surveyed in 2001 census
				Date	No. of pairs	No. of adults	No. of observers	Distance surveyed (km)	No. of hours			
61	Waterside	Albert	21 H/10	6 June	0	0	1	3	1.5	y <sup>2</sup>	y	y
20	Baie de Petit Pokemouche	Gloucester	21 P/10	4 June	3	6	2	1.93	1	y	y	y
1	Beresford	Gloucester	21 P/12	6 June	0	0	1	2.5	1.5	n <sup>3</sup>	y	y
15	Cap Bateau	Gloucester	21 P/15,16	14 June	0	0	4	1		n	y	y
18	Chiasson Office	Gloucester	21 P/10	9 June	0	0	2	2		y	y	y
2	Carron Point	Gloucester	21 P/12	16 June	0	0	1	1.5	1	y	y	y
3	Dune de Maissonnette	Gloucester	21 P/15	6 June	0	0	3	0.5	1.5	y	y	y
19	École la Vague	Gloucester	21 P/10	8 June	0	0	2	2		y	y	y
17	Grand Lac (Lamèque)	Gloucester	21 P/15	9 June	1	2	2	2.08		n	n	y
21	Grand Passage	Gloucester	21 P/10	10 June	3	7	2	4		y	y	y
7	Grande Plaine, Miscou Island	Gloucester	21 P/15,16; 22 A/1,2	10 June	1	2	2	2.5		y	y	y
8	Lac Frye, Miscou Island	Gloucester	21 P/15, 16 & 22 A/1,2	10 June	0	0	2	1.5		y	y	y
4	Marks Point "South", Miscou Island	Gloucester	21 P/15, 16	3 June	0	0	2	1.34	0.5	n	n	y
10	"Middle" Miscou, Miscou Island	Gloucester	21 P/15,16; 22 A/1,2	14 June	3	6	4	2.77		n	y	y
9	Miscou Beach, Miscou Island	Gloucester	21 P/15,16	3 June	2	4	2	3.19	1.5	y	y	y
5	Miscou Centre, Miscou Island	Gloucester	21 P/15,16	7 June	0	0	2	6.78	2.5	n	n	n
14	Pigeon Hill Beach	Gloucester	21 P/15,16; 22 A/1,2	14 June	0	0	4	1.7		y	y	y
13	Pigeon Hill "Sandspit"	Gloucester	21 P/15,16; 22 A/1,2	14 June	0	0	2	3.54	3.5	y	n	y

# 2006 Piping Plover Census

Table 1 (cont'd). Results of 2006 International Piping Plover Breeding Census in New Brunswick.

Map no.	Site name	County	1:50,000 NTS <sup>1</sup> map sheet	Date	2006 census					Surveyed in 1991 census	Surveyed in 1996 census	Surveyed in 2001 census
					No. of pairs	No. of adults	No. of observers	Distance surveyed (km)	No. of hours			
22	Plover Ground "North"	Gloucester	21 P/10	4 June	0	0	2	3.16	1	y	y	y
23	Plover Ground "South"	Gloucester	21 P/10	4 June	0	0	2	1.69	0.5	y	y	y
26	Pointe à Bouleau	Gloucester	21 P/10; 21 P/7	16 June	3	6	2	4		y	y	y
24	Pointe Verte (Green Point)	Gloucester	21 P/10	13 June	3	6	5	6		y	y	y
6	Ruisseau Chenière, Miscou Island	Gloucester	21 P/15,16	7 June	0	0	2	4.74	2.75	y	y	y
16	St-Marie St-Raphaël	Gloucester	21 P/15	9 June	0	0	2	2		n	n	n
25	Tracadie Dune	Gloucester	21 P/10	11 June	5	10	2	5		y	y	y
27	Val Comeau	Gloucester	21 P/7	6 June	0	1	3	4.68	1.5	y	y	y
11	Wilson Point "North", Miscou Island	Gloucester	21P/15,16	7 June	2	5	2	4.05	2.5	y	y	y
12	Wilson Point "South", Miscou Island	Gloucester	21 P/15,16	7 June	0	0	2	2.33	0.5	y	y	y
49	Bar de Cocagne	Kent	21 I/7	13 June	0	0	2	1.9	0.25	y	y	y
48	Dune de Bouctouche	Kent	21 I/10	7 June	4	8	3	12	4.5	y	y	y
45	Chockpish	Kent	21 I/10	12 June	2	4	3	4.4	3	n	n	y
50	Cocagne Island	Kent	21 I/07	12 June	0	0	4	12	1.5	n	n	y
46	Cote Sainte Anne	Kent	21 I/10	9 June	0	0	1	5.2	1	n	n	y
37	** <sup>3</sup> Escuminac (includes Pointe de Pruches)	Kent	21 P/02	6 <sup>3</sup> , 15 June	3 <sup>3</sup> , 7	16	5 <sup>3</sup> , 5	9.04	4 <sup>3</sup> , 5	n	y	y
41	North Kouchibouguac Dune, KNP <sup>6</sup>	Kent	21 I/7	6 June	3	7	3	3.05	3	y	y	y
43	North Richibucto Dune, KNP	Kent	21 I/10	13 June	0	0	2	16.44	4	n	n	y

# 2006 Piping Plover Census

Table 1 (cont'd). Results of 2006 International Piping Plover Breeding Census in New Brunswick.

Map no.	Site name	County	1:50,000 NTS <sup>1</sup> map sheet	2006							Surveyed in 1991 census	Surveyed in 1996 census	Surveyed in 2001 census
				Date	No. of pairs	No. of adults	No. of observers	Distance surveyed (km)	No. of hours				
38	Pointe Sapin	Kent	21 I/15	14 June	0	0	3	3	1.5	y	y	y	
39	**Pointe Sapin Dune, KNP	Kent	21 I/15	5*, 9 June	2*, 2	4*, 4	3	2.87	2.5*, 1.5	y	y	y	
40	Portage River Dune, KNP	Kent	21 I/15	11 June	3	7	3	2	0.5	y	y	y	
47	**Quai de Saint-Edouard	Kent	21 I/10	9*, 16 June	0*, 0	0*, 0	1*, 1	1.5	0.5*, 0.5	n	n	y	
42	South Kouchibouguac Dune, KNP	Kent	21 I/15	6 June	5	13	3	2.5	1	y	y	y	
44	South Richibucto	Kent	21 I/10	16 June	2	4	2	6.92	5	y	y	y	
29	Cedar Road "South"	Northumberland	21 P/7	5 June	2	7	3	4.54	2.5	y	y	y	
30	**Cedar Road "Spit"	Northumberland	21 P/7	6*, 15 June	4*, 5	8*, 10	4*, 3	4	2.5	y	y	y	
33	Dune de Neguac	Northumberland	21 P/07	15 June	2	5	3	7.56	4	y	y	y	
31	Dune de Tabusintac	Northumberland	21 P/07	7 June	12	24	4	7	7.5	y	y	y	
35	Fox Island	Northumberland	21 P/03	15 June	0	0	2	6	2.25	y	y	y	
28	Pointe a Barreau	Northumberland	21 P/07	5 June	1	2	3	2.56	1.5	y	y	y	
34	Portage Island National Wildlife Area	Northumberland	21 P/03	15 June	1	2	2	5.7	2.75	y	y	y	
36	Preston	Northumberland	21 P/02	13 June	0	0	2	3.05	1	y	y	y	
32	Swinging Point	Northumberland	21 P/07	14 June	1	3	4	3		y	y	y	
59	Cadman Point	Westmorland	21 I/01	14 June	0	0	1	2.5	1.5	y	y	y	
54	Cape Bimet "West"	Westmorland	21 I/01	7 June	0	0	1	1.5	0.6	y	y	y	
53	Cap Brulé "East"	Westmorland	21 I/01	12 June	0	0	4	0.5	0.25	y	y	y	

# 2006 Piping Plover Census

Table 1 (cont'd). Results of 2006 International Piping Plover Breeding Census in New Brunswick.

Map no.	Site name	County	1:50,000 NTS <sup>1</sup> map sheet	Date	2006 census							Surveyed in 2001 census
					No. of pairs	No. of adults	No. of observers	Distance surveyed (km)	No. of hours	Surveyed in 1991 census	Surveyed in 1996 census	
60	Cape Jourimain National Wildlife Area	Westmorland	11 L 04	13 June	0	0	1	2	1.5	n	n	y
58	Johnstons Point	Westmorland	21 L 01	14 June	0	0	1	1.3	0.8	y	y	y
56	Landry "East"	Westmorland	21 L 01	12 June	0	0	4	0.5	0.2	y	y	y
57	Little Cape	Westmorland	21 L 01	12 June	0	0	4	1	0.5	y	y	y
55	Petit Barachois	Westmorland	21 L 01	12 June	0	0	4	0.1	0.15	y	y	y
51	Pointe Grande-Digue	Westmorland	21 L 07	7 June	0	0	2	1	0.5	y	y	y
52	Shediac Island	Westmorland	21 L 07	12 June	0	0	4	2	0.5	n	n	y
Totals					73*, 78	166*, 171	153	220.11	86			

<sup>1</sup>NTS = National Topographic System

<sup>2</sup>y = yes

<sup>3</sup>n = no

<sup>4</sup>\*\* = Beaches included in detectability study

<sup>5</sup>\* = Data from first survey of beaches included in detectability study

<sup>6</sup>KNP = Kouchibouguac National Park

Table 2. Piping Plover distribution in New Brunswick per county, 1991-2006.

County	1991		1996		2001		2006	
	Pairs (%)	Adults (%)	Pairs (%)	Adults (%)	Pairs (%)	Adults (%)	Pairs (%)	Adults (%)
Albert	1 (1)	2 (1)	-	-	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Charlotte	0 (0)	0 (0)	-	-	-	-	-	-
Gloucester	40 (44)	90 (44)	37 (57)	81 (56)	35 (44)	73 (44)	26 (35)	55 (33)
Kent	24 (26)	48 (24)	15 (23)	33 (23)	16 (20)	36 (22)	25 (34)	61 (37)
Northumberland	24 (26)	59 (29)	13 (20)	32 (22)	27 (34)	56 (34)	23 (31)	51 (30)
Westmorland	2 (2)	4 (2)	0 (0)	0 (0)	1 (1)	2 (1)	0 (0)	0 (0)
Total	91	203	65	146	79	167	74	167

Table 3. Results of Piping Plover detectability study in New Brunswick.

Site name	Survey results		Difference
	#1	#2	
Cedar Road "Spit"	8	10	+2
Escuminac	13	16	+3
Pointe Sapin Dune, Kouchibouguac National Park	4	4	0
Quai de St. Édouard	0	0	0



## 2006 Piping Plover Census

Table 4. Piping Plover productivity in New Brunswick, 2006.

Beach	County	Pairs monitored	Successful nests	Fledged	Productivity
Baie de Petit Pokemouche	Gloucester	3	0	0	0.00
Dune de Bouctouche	Kent	4	4	12	3.00
Cedar Road "South"	Northumberland	3	3	4	1.33
Tracadie Dune	Gloucester	4	4	9	2.25
Grande Plaine, Miscou Island	Gloucester	1	1	4	4.00
Wilson Point "North", Miscou Island	Gloucester	3	3	9	3.00
Grand Passage	Gloucester	2	2	8	4.00
Pointe Verte	Gloucester	1	1	2	2.00
"Middle" Miscou, Miscou Island	Gloucester	2	2	4	2.00
North Kouchibouguac Dune, KNP <sup>1</sup>	Kent	4	4	8	2.00
Escuminac	Kent	9	7	21	2.33
Pointe Sapin Dune, KNP	Kent	2	2	2	1.00
Pointe a Barreau	Northumberland	2	1	3	1.50
Pointe a Bouleau	Gloucester	3	3	10	3.33
Portage River Dune, KNP	Kent	4	4	7	1.75
South Kouchibouguac Dune, KNP	Kent	7	3	6	0.86
South Richibucto	Kent	2	0	0	0.00
Dune de Tabusintac	Northumberland	6	6	14	2.33
Chockpish	Kent	2	1	3	1.50
Grand Lac	Gloucester	1	1	1	1.00
Plover Ground "South"	Gloucester	1	1	3	3.00
Cedar Road "Spit"	Northumberland	2	2	3	1.50
Swinging Point	Northumberland	1	0	0	0.00
South Richibucto ("North Barrier Island")	Kent	1	1	3	3.00
Total		70	56	136	1.94

<sup>1</sup> KNP = Kouchibouguac National Park

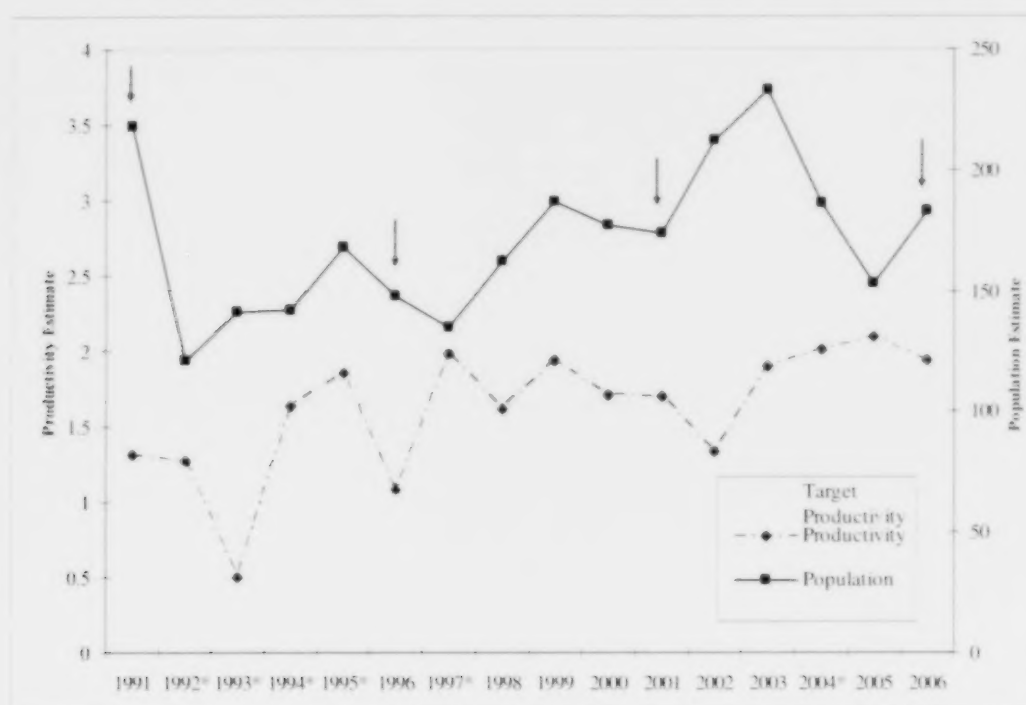


Figure 2. Piping Plover population and productivity estimates in New Brunswick, 1991 - 2006 (\* indicates an incomplete population survey and arrows indicate international census years).

## 2006 Piping Plover Census

Table 5. Piping Plover census results and sites surveyed in New Brunswick, 1991-2006.

	1991	1996	2001	2006
Pairs	91	65	79	73*, 78
Adults	203	146	167	166*, 171
Sites	41	47	66	60
New census sites	41	9	10	2
Occupied sites	24	26	30	26
New occupied sites		1	1	1

\* Denotes first survey results from detectability study.

# 2006 Piping Plover Census

Table 6. Changes in abundance in Piping Plovers in New Brunswick, comparison of 1991, 1996, 2001 and 2006 international censuses

Site	County	No. of pairs				No. of adults				Percent change (pairs)			
		1991	1996	2001	2006	1991	1996	2001	2006	1991-1996	1996-2001	1996-2006	2001-2006
Waterside	Albert	1	nc	0	0	2	nc	0	0	-	-	-	0.0
Baie de Petit Pokemouche	Gloucester	3	1	2	3	6	3	4	6	-66.7	+100.0	+200.0	+50.0
Beresford	Gloucester	nc	0	0	0	nc	0	0	0	-	0.0	0	0.0
Cap Bateau	Gloucester	nc	0	0	0	nc	0	0	0	-	0.0	0	0.0
Carron Point	Gloucester	0	0	0	0	0	0	0	0	0.0	0.0	0	0.0
Chasson Office	Gloucester	0	1	0	0	0	2	0	0	+	-100.0	-100	0.0
Dune de Maisonneuve	Gloucester	0	0	0	0	0	0	0	0	0.0	0.0	0	0.0
École la Vague	Gloucester	0	2	1	0	0	4	2	0	+	-50.0	-100	-100.0
Grand Lac (Lamèque)	Gloucester	nc	nc	0	1	nc	nc	0	2	-	-	-	+
Grand Passage	Gloucester	10	4	4	3	20	8	8	7	-60.0	0.0	-25.0	-25.0
Grande Plaine, Miscou Island	Gloucester	0	6	1	1	4	12	4	2	+	-83.3	-83.3	0.0
Lac Frye, Miscou Island	Gloucester	2	1	0	0	4	2	0	0	-50.0	-100.0	-100.0	0.0
Marks Point "South", Miscou Island	Gloucester	nc	nc	0	0	nc	nc	0	0	-	-	-	0.0
"Middle" Miscou, Miscou Island	Gloucester	nc	1	1	3	nc	2	2	6	+	0.0	+200.0	+200.0
Miscou Beach, Miscou Island	Gloucester	1	1	0	2	3	2	0	4	0.0	-100.0	+100.0	+
Miscou Centre, Miscou Island	Gloucester	nc	nc	nc	0	nc	nc	nc	0	-	-	-	-
Pigeon Hill Beach	Gloucester	2	1	0	0	5	3	0	0	-50.0	-100.0	-100.0	0.0
Pigeon Hill "Sandspit"	Gloucester	0	nc	1	0	0	nc	2	0	-	-	-	-100.0
Plover Ground "North"	Gloucester	2	3	0	0	5	7	1	0	+50.0	-100.0	-100.0	-
Plover Ground "South"	Gloucester	0	0	1	0	0	0	2	0	-	+	0.0	-100.0
Pointe à Bouleau	Gloucester	6	6	4	3	13	14	8	6	0.0	-20.0	-50.0	-25.0
Pointe Verte (Green Point)	Gloucester	5	2	5	3	10	4	10	6	-60.0	+150	+50.0	-40.0
Ruisseau Chemière, Miscou Island	Gloucester	0	0	1	0	0	0	2	0	0.0	+	0.0	-100.0
St-Marie St-Raphael	Gloucester	nc	nc	nc	0	nc	nc	nc	0	-	-	-	-
Tracadie Dune	Gloucester	6	5	11	5	12	12	22	10	-16.7	+120.0	0.0	-54.5
Val Comeau	Gloucester	1	1	1	0	2	2	2	1	0.0	0.0	-100.0	-100.0
Wilson Point "North", Miscou Island	Gloucester	1	1	2	2	3	2	4	5	0.0	+100.0	+100.0	0.0
Wilson Point "South", Miscou Island	Gloucester	1	1	0	0	3	2	0	0	0.0	-100.0	-100.0	0.0

# 2006 Piping Plover Census

Table 6 (cont'd) Changes in abundance in Piping Plovers in New Brunswick: comparison of 1991, 1996, 2001 and 2006 international censuses.

Site	County	No. of pairs				No. of adults				Percent change (pairs)			
		1991	1996	2001	2006	1991	1996	2001	2006	1991-1996	1996-2001	1996-2006	2001-2006
Bar de Cocagne	Kent	0	0	0	0	0	0	0	0	0.0	0.0	0	0.0
Dune de Bouctouche	Kent	7	2	5	4	14	5	11	8	-71.4	+150.0	+100.0	-20.0
Chockpish	Kent	nc	nc	1	2	nc	nc	2	4	-	-	-	+100.0
Cocagne Island	Kent	nc	nc	0	0	nc	nc	0	0	-	-	-	0.0
Cote Sainte Anne	Kent	nc	nc	0	0	nc	nc	0	0	-	-	-	0.0
**Escuminac (includes Pointe de Pruches)	Kent	nc	2	1	3*, 7	nc	4	2	13*, 16	-	-50.0	*+50.0, +250.0	*+200.0, +600.0
North Kouchibouguac Dune, KNP	Kent	4	4	2	3	8	9	6	7	0.0	-50.0	-25.0	+50.0
North Richibucto Dune, KNP	Kent	nc	nc	0	0	nc	nc	0	0	-	-	-	0.0
Ponte Sapin	Kent	0	1	0	0	0	2	0	0	-	-100.0	-100.0	0.0
**Pointe Sapin Dune, KNP	Kent	1	1	1	2*, 2	2	2	2	4*, 4	0.0	0.0	+100.0	+100.0
Portage River Dune, KNP	Kent	3	1	4	3	6	3	8	7	-66.7	+300.0	+200.0	-25.0
**Quai de Saint-Edouard	Kent	nc	nc	0	0*, 0	nc	nc	0	0*, 0	-	-	-	0.0
South Kouchibouguac Dune, KNP	Kent	6	4	1	5	12	8	3	13	-33.3	-75.0	+25.0	+400.0
South Richibucto	Kent	2	0	1	2	4	0	2	4	-100.00	-	-	+100.0
Cedar Road "South"	Northumberland	8	3	1	2	16	7	2	7	-62.5	-66.7	-33.3	+100.0
**Cedar Road "Spit"	Northumberland	-	-	4	4*, 8	-	-	8	8*, 10	-	-	-	*0.0, +25.0
Dune de Neguac	Northumberland	8	3	6	2	19	6	12	5	-62.5	+100.0	-33.3	-66.7
Dune de Tabusintac	Northumberland	7	5	8	12	21	12	17	24	-28.6	+60.0	+120.0	+50.0
Fox Island	Northumberland	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0
Pointe a Barreau	Northumberland	0	1	1	1	0	2	2	2	-	0.0	0.0	0.0
Portage Island National Wildlife Area	Northumberland	1	1	3	1	2	3	7	2	0.0	+200.0	0.0	-66.7
Preston	Northumberland	0	0	0	0	1	0	0	0	0.0	0.0	0.0	0.0
Swinging Point	Northumberland	0	0	3	1	0	2	6	3	0.0	-	-	-66.7
Cadman Point	Westmorland	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0
Cape Bimet "West"	Westmorland	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0
Cap Brulé "East"	Westmorland	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0
Cape Jourmain National Wildlife Area	Westmorland	nc	nc	1	0	nc	nc	2	0	-	-	-	-100.0
Johnstons Point	Westmorland	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0
Landry "East"	Westmorland	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0

# 2006 Piping Plover Census

Table 6 (cont'd). Changes in abundance in Piping Plovers in New Brunswick: comparison of 1991, 1996, 2001 and 2006 international censuses.

Site	County	No. of pairs				No. of adults				Percent change (pairs)			
		1991	1996	2001	2006	1991	1996	2001	2006	1991-1996	1996-2001	1996-2006	2001-2006
Little Cape	Westmorland	1	0	0	0	2	0	0	0	0.0	0.0	0.0	0.0
Petit Barachois	Westmorland	1	0	0	0	2	0	0	0	-100.0	0.0	0.0	0.0
Pointe Grande-Digue	Westmorland	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0
Shediac Island	Westmorland	nc	nc	0	0	nc	nc	0	0	-	-	-	0.0

nc = Not censused

\*\* Denotes sites included in detectability study

\* Denotes first survey data for detectability study sites

KNP = Kouchibouguac National Park

## **Recensement international du Pluvier siffleur au Québec, en 2006**

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### **Résumé**

Au cours du quatrième Recensement international du Pluvier siffleur effectué en territoire québécois, seul les plages des Îles-de-la-Madeleine ont été visitées. Au total, au cours de la journée d'inventaire du 10 juin 2006, 63 Pluviers siffleurs (22 couples et 19 individus seuls) ont été dénombrés sur les 124 km de plages parcourus par 33 participants.

### **Abstract**

In Québec, the fourth International Piping Plover Census was conducted on June 10, 2006. The Magdalen Islands' beaches were the only surveyed areas. A total of 63 Piping Plovers (22 pairs and 19 singles) were counted by 33 volunteers along 124 km of beaches.

### **Introduction**

Les Îles-de-la-Madeleine constituent maintenant le seul endroit au Québec où le Pluvier siffleur (*Charadrius melodus*) se reproduit (Laporte et Shaffer 1994; Laporte et Shaffer 2004; Shaffer 2005). Les régions de la Gaspésie et de la Côte-Nord s'avèrent inoccupées par l'espèce depuis plusieurs années. En fait, lors des recensements effectués dans ces régions en 1991, 1996 et 2001, aucun Pluvier siffleur n'y a été observé (Laporte et Shaffer 1994; Laporte et Shaffer 2004; Shaffer 2005).

Ce document présente les résultats du Recensement international du Pluvier siffleur réalisé au Québec en 2006.

### **Méthodologie**

En 2006, la méthodologie utilisée pour mener à bien le Recensement international du Pluvier siffleur est similaire à celle utilisée lors des précédents inventaires (Laporte et Shaffer 1994; Laporte et Shaffer 2004; Shaffer 2005). Toutefois, la différence majeure réside dans le fait



qu'en 2006, les plages de la Gaspésie et de la Côte-Nord n'ont pas été inventoriées. Comme aucun Pluvier siffleur n'a été vu lors des inventaires de 1991, 1996 et 2001 et compte tenu des coûts pour réaliser les inventaires dans ces régions, il a été décidé de ne pas recenser les plages de ces régions.

Pour assurer une couverture complète des plages aux Îles-de-la-Madeleine, l'inventaire s'est déroulé en une seule journée. Cette activité, à laquelle des bénévoles sont invités à participer, permet à la fois l'implication du public et la récolte d'information sur le Pluvier siffleur. Par ailleurs, au cours de l'été 2006, le personnel d'Attention Fragiles, en collaboration avec le Service canadien de la faune, ont effectué des travaux liés au suivi de la population et à la protection des nids de Pluviers siffleurs. Ce suivi, plus exhaustif, permet d'obtenir un décompte plus complet et plus précis du nombre de couples de Pluviers siffleurs nichant aux Îles-de-la-Madeleine. Avec les données récoltées lors de l'inventaire se déroulant en une seule journée et avec celles provenant du suivi complet sur l'ensemble de la saison, il est possible d'établir une comparaison entre les deux méthodes.

Pour les Recensements internationaux du Pluvier siffleur antérieurs à 2006, les résultats publiés pour le Québec correspondaient aux décomptes finaux de la saison de nidification. En 2006, il a été décidé de transmettre les données récoltées uniquement durant la période 3 au 16 juin. De cette façon, les résultats seront davantage comparables avec ceux des autres régions où s'effectuent également le Recensement international du Pluvier siffleur.

### Résultats

Au cours de la journée du 10 juin 2006, 63 Pluviers siffleurs adultes ont été vus aux Îles-de-la-Madeleine, dont 22 couples et 19 individus seuls (tableau 1). Les 33 participants ont noté le Pluvier siffleur à 11 des 15 plages inventoriées. Les sites avec le plus d'oiseaux sont ceux de la dune du Sud et de la plage de l'Hôpital, avec respectivement 18 et 17 adultes. Ces deux sites totalisent 55,5 % des oiseaux dénombrés lors de cette journée d'inventaire.

Au total, 124,2 km de plage ont été parcourus. Seules les plages de l'île Brion, de "l'îlot C" et de "l'îlot B" n'ont pas été inventoriées. La répartition du Pluvier siffleur dans l'archipel des Îles-de-la-Madeleine est légèrement différente de celle de 2001. En effet, trois plages où le Pluvier siffleur était absent en 2001 ont été occupées par l'espèce en 2006. Il s'agit des plages de la Digue, de la pointe de l'Est et de la pointe de la Grande-Entrée (Figure 1).

La journée du recensement, soit le 10 juin, l'éclosion des œufs de deux nids a été constatée sur les plages de la dune du Sud et de la Pointe. Il s'agit de la date la plus hâtive d'éclosion jamais enregistrée aux Îles-de-la-Madeleine.

En plus du recensement qui s'est effectué le 10 juin, des travaux de suivi et de protection des nids de Pluviers siffleurs se sont déroulés durant tout l'été 2006, du 15 mai au 15 août. Ces travaux impliquent nécessairement la recherche de tous les nids, ce qui a permis d'en dénombrier 47. Il a été déterminé que six de ces nids étaient vraisemblablement des pontes de remplacement, si bien que nous estimons à 41, le nombre de couples reproducteurs. Pour l'ensemble de la saison de nidification, 78 oisillons ont atteint l'âge de 25 jours. Il s'agit d'un bon succès de reproduction puisque 1,9 oisillon par couple reproducteur a été produit, ce qui est supérieur à l'objectif fixé par le programme de rétablissement qui est de 1,65 oisillon par couple.

### Discussion

Avec les 63 individus recensés en 2006, la population de Pluviers siffleurs présente aux Îles-de-la-Madeleine est donc inférieure aux résultats des inventaires quinquennaux antérieurs. Cette baisse est de l'ordre de -10% par rapport à 2001 (70 individus), de -40% par rapport à 1996 (104 individus) et de -17% par rapport à 1991 (76 individus).

Il faut toutefois rappeler que la façon de rapporter les données en 2006 pour le Québec contribue à cet état de fait. En effet, lors des inventaires précédents, les données rapportées pour le Québec étaient ceux de l'ensemble de la saison de nidification. Par souci de conformité avec la méthodologie utilisée ailleurs en Amérique du Nord, il a été décidé de ne rapporter que les données d'une seule journée d'inventaire durant laquelle toutes les plages ont été inventoriées. De cette façon, à partir de 2006, les données du Québec seront davantage comparables avec celles des autres régions d'Amérique du Nord. Par contre, les résultats présentés dans ce rapport amènent une certaine sous-estimation du nombre de couples aux Îles-de-la-Madeleine par rapport aux inventaires quinquennaux antérieurs.

Les décomptes annuels réalisés aux Îles-de-la-Madeleine depuis 2001 donnent par ailleurs une meilleure idée de la tendance de la population. En effet, dans le cadre des travaux visant la protection du Pluvier siffleur aux Îles-de-la-Madeleine, l'effort de recherche est beaucoup plus important que pour un inventaire se déroulant en une seule journée. À partir du nombre de nids trouvés au cours de la saison de nidification et en tenant compte des nids de remplacement, il est possible d'établir le nombre de couples nicheurs. À partir des données ainsi obtenues, de 2001 à 2006, la Figure 2 montre que la population est en hausse. En effet, alors qu'il y avait 35 couples

en 2001, la population a été établie à 37 couples en 2002, 2003 et 2004. Par la suite, elle a augmenté à 41 couples en 2005 et 2006.

Pour chacune des années où des inventaires internationaux du Pluvier siffleur ont eu lieu, la Figure 3 montre les données d'un inventaire se déroulant en une seule journée en comparaison avec celles obtenues pour l'ensemble d'une même saison de nidification. En moyenne, les inventaires qui se déroulent en une seule journée permettent la détection de  $79,8\% \pm 2,9$  des oiseaux dénombrés pour l'ensemble de la saison de nidification.

Compte tenu du fait qu'aucun Pluvier siffleur n'a été vu lors des recensements effectués en 1991, 1996 et 2001 sur les plages de la Côte-Nord et de la Gaspésie, il est permis de croire que l'absence de recensement en 2006 dans ces régions n'a pas affecté la valeur du décompte au Québec.

Aux Îles-de-la-Madeleine, afin d'accroître le succès de reproduction, des mesures de protection sont mises en place depuis plus de 15 ans. Ces mesures consistent en l'installation de clôtures autour des nids, la pose d'enclos en broche pour éviter la prédation des œufs et la mise en œuvre d'un programme de sensibilisation. L'année 2006 n'a pas fait exception puisque 30 nids ont été protégés par des enclos et des clôtures. De plus, depuis 2004, une section de 2,5 kilomètres de la plage de l'Hôpital est délimitée sur le terrain à l'aide d'affiches et de poteaux. Cette importante zone de nidification est très vulnérable aux perturbations humaines puisque les sources de dérangement y sont multiples : aire de baignade et de pique-nique, sentier de véhicules tout-terrain, circulation motorisée, chars à voile, etc. Pour réduire le dérangement à l'intérieur de cette zone, une surveillance étroite est effectuée par des agents de conservation de la faune et par des gardiens de plages. Les utilisateurs de cette plage sont ainsi sensibilisés au fait que cette zone constitue un secteur de première importance pour la nidification et l'élevage des oisillons du Pluvier siffleur. Ce nouveau moyen de protection mis en place assure une protection additionnelle à cette section de plage qui abrite la plus forte densité de Pluviers siffleurs aux Îles-de-la-Madeleine, soit plus de quatre couples par kilomètre de plage.

### Remerciements

Des remerciements sincères vont à tous les participants de l'inventaire du 10 juin 2006 : Fanny Arseneau, Catherine Boily, Benoît Boudreau, Sylvia Bourque, Hélène Chevrier, Catherine Chevrier-Turbide, Liliane Décoste, Pierre-Luc Deveau, Yvette Doucet, Lucienne Harvie, Guillaume Lapierre, Nancy Lapierre, Carole Leblanc, Édouard Leblanc, Guylaine Leblanc, Line

Leblanc, Marie Leblanc, Esther Noël de Tilly, Alain Richard, Jean-Claude Richard, Noël Richard, Claude Roy, Jonas Sahlin, Hélène Tivemark, Blandine Vigneau et Johanne Vigneau.

Des remerciements vont également à l'organisme Attention Fragiles qui a coordonné la journée d'inventaire. Ce groupe travaille avec énergie à protéger annuellement le Pluvier siffleur aux Îles-de-la-Madeleine. Finalement, Alexandre Rivard a commenté une version préliminaire de ce texte.

Tableau 1. Résultats de l'inventaire du Pluvier siffleur au Québec en 2006.

Carte	Site	Région	1:50,000 NTS <sup>1</sup> map sheet	Date	Inventaire 2006					Recensé en 1991	Recensé en 1996	Recensé en 2001
					Nombre de couples	Nombre d'adultes	Nombre d'observateurs	Distance parcourue	Nombre d'heures (hh:mm)			
4	Bassin aux Huitres "est"	Îles-de-la-Madeleine	11N/12	10 juin	1	4	1	1.7	2:00	oui	oui	oui
5	Bassin aux Huitres "ouest"	Îles-de-la-Madeleine	11N/12	10 juin	0	0	1	0.6	0:45	oui	oui	oui
16	Dune du Bassin	Îles-de-la-Madeleine	11N/04	10 juin	0	0	2	3.2	1:15	oui	oui	oui
1	Dune du Nord	Îles-de-la-Madeleine	11N/12	10 juin	0	1	1	16.4	5:20	oui	oui	oui
9	Dune du Sud	Îles-de-la-Madeleine	11N/05 & 11N/12	10 juin	8	18	4	19.9	7:00	oui	oui	oui
2	Île Brion	Îles-de-la-Madeleine	11N/13 & 11N/14	-	-	-	-	-	-	oui	oui	oui
8	"Îlot B"	Îles-de-la-Madeleine	11 N/12	-	-	-	-	-	-	oui	oui	non
7	"Îlot C"	Îles-de-la-Madeleine	11 N/12	-	-	-	-	-	-	oui	oui	non
12	La Digue	Îles-de-la-Madeleine	11N/05	10 juin	0	1	2	2.1	0:55	oui	oui	oui
11	La Pointe	Îles-de-la-Madeleine	11N/05	10 juin	0	1	2	1.5	0:55	oui	oui	oui
10	Plage de l'Hôpital	Îles-de-la-Madeleine	11N/05 & 11N/12	10 juin	6	17	3	17.5	4:40	oui	oui	oui
14	Plage Martinique-Havre- Aubert	Îles-de-la-Madeleine	11N/05 & 11N/04	10 juin	0	1	5	12.6	3:30	oui	oui	oui
15	Plage du Havre	Îles-de-la-Madeleine	11N/04	10 juin	0	0	2	4.4	2:30	oui	oui	oui
18	Plage de l'Ouest	Îles-de-la-Madeleine	11N/05 & 11M/08	10 juin	2	7	3	11.0	6:45	oui	oui	oui
3	Pointe de l'Est	Îles-de-la-Madeleine	11N/11	10 juin	2	5	2	19.5	7:00	oui	oui	oui
6	Pointe de la Grande-Entrée	Îles-de-la-Madeleine	11N/12	10 juin	1	2	1	0.8	1:20	oui	oui	oui
17	Dune du Sandy Hook	Îles-de-la-Madeleine	11N/04 & 11N/05	10 juin	2	6	2	12.2	3:15	oui	oui	oui
13	Étang Procul-Bourgeois	Îles-de-la-Madeleine	11N/05	10 juin	0	0	2	0.8	1:45	oui	oui	oui
Totals					22	63	33	124.2	48:55			

<sup>1</sup>NTS = National Topographic System

2006 International Piping Plover Breeding Census  
- Quebec -

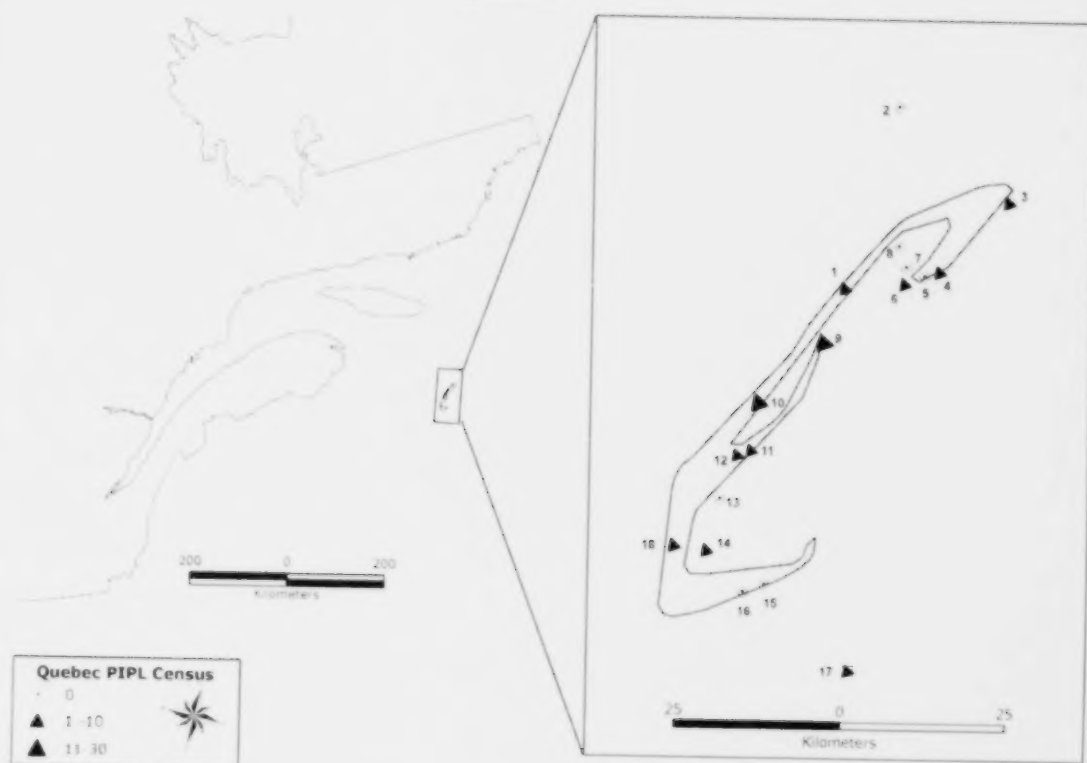


Figure 1. La répartition du Pluvier siffleur au Québec pendant le recensement de 2006.

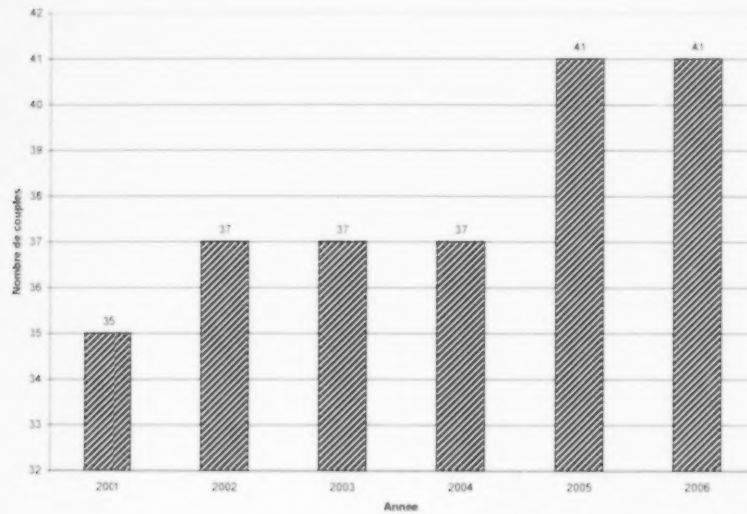


Figure 2. Nombre de couples reproducteurs de Pluviers siffleurs aux Îles-de-la-Madeleine de 2001 à 2006, déterminé à l'aide des suivis annuels se déroulant sur l'ensemble de la saison de nidification.

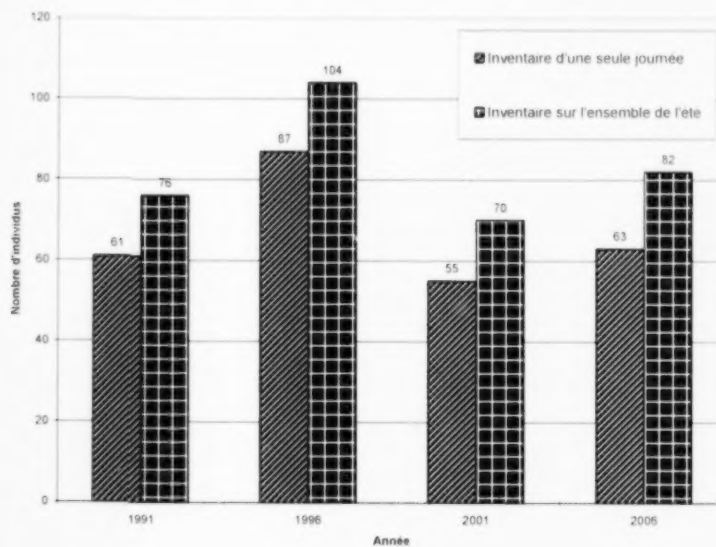


Figure 3. Comparaison du nombre de Pluviers siffleurs observés lors d'une seule journée d'inventaire par rapport au nombre total d'adultes nicheurs pour l'ensemble d'une saison de nidification pour les années 1991, 1996, 2001 et 2006.



## The 2006 Piping Plover Census in Ontario

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### Abstract

Former and existing breeding locations of the Piping Plover (*Charadrius melodus circumcinctus*) in Ontario were censused as part of the 2006 International Piping Plover Census. A total of 45 locations were surveyed in Ontario resulting in two adult plovers being reported. One plover was observed on 31 May at Windy Point, Lake of the Woods and one plover was observed at Presqu'île Provincial Park on 29-30 May. This is similar to the 2001 International Piping Plover Census when two adult birds were observed in Ontario. While Piping Plovers continue to be reported in Ontario, there has not been a successful nesting attempt during the last three years. Ontario is hopeful that recovery efforts in nearby Michigan continue to expand this population and eventually result in the re-colonization of former Ontario Great Lakes breeding sites. Conservation measures include the use of predator exclosures on all nests and signage of nesting habitat to prevent human disturbance during the nesting period.

### Résumé

Le recensement international des pluviers siffleurs (*Charadrius melodus circumcinctus*) de 2006 en Ontario a été effectué dans les anciennes aires de reproduction et dans les aires de reproduction actuelles de l'oiseau. On a prospecté au total 45 aires en Ontario, et deux pluviers adultes ont été recensés. Le premier a été vu le 31 mai à Windy Point, lac des Bois, et l'autre, au parc provincial Presqu'île les 29 et 30 mai. Il s'agit de données similaires à celles du recensement international des pluviers siffleurs de 2001 où deux oiseaux adultes avaient été observés en Ontario. Bien qu'on continue à dénombrer des pluviers siffleurs en Ontario, aucune tentative de nidification n'a abouti au cours des trois dernières années. L'Ontario a bon espoir que les mesures mises en place au Michigan voisin permettront de faire croître la population et entraîneront un rétablissement des colonies dans les anciens sites de reproduction entourant la région des Grands Lacs du côté de l'Ontario. En guise de mesures de protection, on se sert d'exclos de prédateurs pour tous les nids et de panneaux signalant les habitats de nidification de l'oiseau pour éviter les perturbations d'origine humaine durant la période de nidification.

## **Introduction**

An intensive survey of former breeding locations of the Piping Plover in Ontario was conducted during 2006 as part of the International Piping Plover Census. Former and potential breeding locations along the Great Lakes shorelines (Lakes Superior, Huron, Erie, Ontario) and Lake of the Woods, Ontario, were surveyed as part of this census. This paper describes the 2006 census results in comparison to the 2001, 1996 and 1991 censuses (Heyens 2005) and where possible, relates these results to historical numbers and distribution of the Piping Plover in Ontario. Lastly, a brief discussion is included which summarizes the status of the plover in Ontario and conservation measures to protect this endangered species.

## **Methods**

Forty-five locations within Ontario were censused during 2006 (41 sites on the Ontario Great Lakes and four sites on Lake of the Woods – Figure 1) compared to 37 sites during the 2001 survey, 17 sites during the 1996 survey, and three sites during the 1991 survey. All of these locations were surveyed on foot with some locations requiring the use of a boat to access offshore islands.

Two known plover nesting sites on the Ontario portion of Lake of the Woods were censused during the survey period. Windy Point and the Sable Islands Provincial Nature Reserve were surveyed on 9 and 10 June, respectively. These sites were accessed by boat from Kenora, Ontario. The entire length of Sable Islands (6 km) was walked and approximately 1 km of suitable habitat at the tip of Windy Point (including two breached islands) was covered on foot during the survey.

A number of potential plover nesting sites consisting of large sand beaches on the south side of Big Island (Oshie Bay) and Bigsby Island (Deep Bay) on Lake of the Woods were also surveyed during 2006. Three potential nesting sites were surveyed on Lake Superior and twenty-four potential sites, including a number of former nesting locations, were surveyed on Lake Huron. Ten high potential nesting sites, including known historical nesting locations, were surveyed on Lake Erie, four potential nesting sites on Lake Ontario, and lastly, one low potential site along the Ottawa River.

## **Results**

Piping Plovers were located at only two of the 45 sites censused (Table 1). One adult was observed at Windy Point on 31 May and one banded adult was observed at Presqu'île Provincial Park on 29-30 May on Lake Ontario. The band combination from the Presqu'île plover was determined to be that of a fledgling bird banded in Michigan. In addition, one adult plover was

observed on Windy Point on a repeat site visit on 20 July and was quite likely a non-breeding bird or early migrant. Lastly, another banded adult was observed at Wasaga Beach Provincial Park on 3 May. The band combination of the Wasaga Beach plover could not be traced. Piping Plovers were not observed at any of the remaining 43 surveyed sites during the 2006 census period.

### General Comments

An examination of the individual site survey forms suggests that weather conditions were not a factor in locating plovers during the survey window. All of the 45 sites were surveyed during relatively stable weather conditions. Water levels on Lake of the Woods and on the Ontario Great Lakes were well below normal during 2006 resulting in greater availability of potential nesting habitat.

Plover census volunteers were quite disappointed with the census results for Ontario. Wasaga Beach Provincial Park staff were hopeful that an attempted nesting of a pair of plovers at the park in 2005 would result in another attempt in 2006. The Michigan population of Piping Plovers continues to do well and the best hope for the Ontario Great Lakes is for this growing population to re-colonize former breeding locations in Ontario. Given the intensive census effort in 2006 in Ontario, it would have been difficult for a breeding pair of plovers to go undetected. It is however, encouraging for Ontario to report two individual sightings of plovers from the Great Lakes and two from Lake of the Woods during the breeding season. Ontario remains optimistic that a breeding pair will establish itself at one of the former breeding sites.

### Discussion

The Piping Plover was once widespread throughout the Great Lakes Region with numbers estimated to be approximately 150 breeding pairs (Cadman et al. 1987). Significant population declines occurred during the 1960s and 1970s and the last known successful breeding attempt in southern Ontario occurred in 1977 at Long Point Beach on Lake Erie (Lambert and Nol 1978). A variety of explanations have been put forward to explain the population decline. It would appear that one of the primary reasons is the increasing use of beach habitat for recreational purposes. The destruction of nests and young by pedestrian and vehicular traffic and the disturbance of nesting birds by recreationists are the main concerns. Increasing numbers of natural predators such as raccoons (*Procyon lotor*), foxes (*Vulpes vulpes*), gulls (*Larus* spp.), and crows (*Corvus brachyrhynchos*) may have contributed to the decline (Cairns and McLaren 1980).

A small remnant population of Piping Plovers continues to breed on Lake of the Woods. This population is shared between Minnesota and Ontario along the Canada–United States border.

While the 2006 international census did not document any breeding evidence on the Ontario side of Lake of the Woods, one adult plover was recorded at Windy Point. The 1996 and 2001 international censuses documented three birds and one bird at this same location, respectively. Minnesota reported two nesting attempts from Lake of the Woods during the census period (K. Haws, pers. comm.). Plovers continue to be reported on a regular basis from other parts of Ontario as well (Heyens 2000-06), and the attempted nesting of a pair of plovers at Wasaga Beach Provincial Park in 2005 bodes well for the eventual re-colonization of this former breeding site. Annual censuses will continue to be carried out on the Lake of the Woods population and predator exclosures and endangered species signage will continue to be used at or near any nest sites.

### **Acknowledgements**

I wish to thank the Ontario Ministry of Natural Resources Species at Risk Program for providing funding to conduct the 2006 International Piping Plover Census in Ontario. As well, a special thanks to Barbara Campbell, Canadian Wildlife Service (Ontario) who spent countless hours preparing survey materials for the Ontario Great Lakes portion of the census and for her assistance with the preparation of this summary report. Thanks also to Karen Hartley and to Scott Jones (Ontario Ministry of Natural Resources) for their ongoing assistance with Ontario survey efforts. Lastly, thanks to the many dedicated volunteers who gave of their time and effort to undertake surveys of potential plover habitats in Ontario.

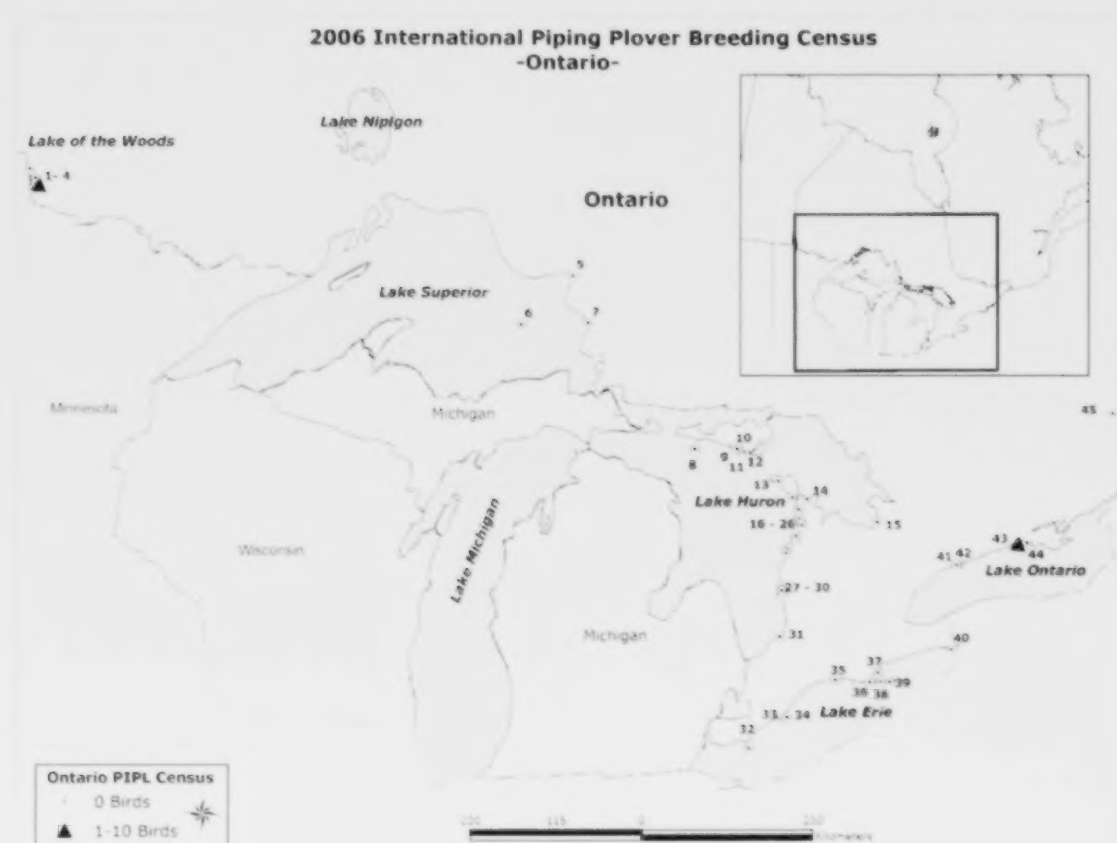


Figure 1. Location of sites censused in Ontario during the 2006 International Piping Plover Breeding Census.

## 2006 Piping Plover Census

Table 1. Locations and numbers of Piping Plovers found in Ontario 1991, 1996, 2001 and 2006.

Map no.	Lake	Location	1:50,000 NTS <sup>1</sup> map sheet	Adults 1991	Adults 1996	Adults 2001	Adults 2006
7	Superior	Agawa Bay, Lake Superior Provincial Park	41N/7	n <sup>2</sup>	0	0	0
25	Huron	Baie du Dore	41A/5	n	n	0	0
1	LoW <sup>3</sup>	Big Island - Oshie Bay	52E/2	n	0	0	0
2	LoW	Bigsby Island - Deep Bay	52E/2	n	0	0	0
6	Superior	Caribou Island	41N/5	n	0	0	0
11	Huron	Carter Bay	41G/9	n	n	0	0
19	Huron	Chief's Point	41A/11	n	n	0	0
42	Huron	Darlington Provincial Park	30M/15	n	n	n	0
8	Huron	Desert Point, Great Duck Island	41G/10	n	0	0	0
13	Huron	Dorcas Bay, Singing Sands	41H/4	n	n	0	0
5	Superior	Driftwood Beach, Michipicoten Post Provincial Park	41N/15	n	n	0	0
33	Erie	Erieau Beach	40I/5	n	n	n	0
29	Huron	Golf Course Rd. N. to Point Farms Provincial Park	40P/13	n	n	0	0
30	Huron	Golf Course Rd. S. to Sunset Beach	40P/13	n	n	0	0
36	Erie	Hahn Woods to Hastings Drive - Long Point	40I/9	n	n	0	0
14	Huron	Hope Bay	41A/14	n	n	0	0
	Huron	Horseshoe Bay, Great Duck Island	41G/10	n	0	0	n
26	Huron	Inverhuron Provincial Park	41A/5	n	n	n	0
45	Ottawa River	Kitchissippi Lookout, Ottawa	31G/5	n	n	n	0
39	Erie	Long Point-Courtright Ridge East	40I/9	0	0	1	0
38	Erie	Long Point-Courtright Ridge West	40I/9	0	0	0	0
12	Huron	Michael's Bay	41G/9	n	n	0	0
24	Huron	Miramichi Horseshoe Bay	41A/6	n	n	0	0
16	Huron	Myles Bay	41A/14	n	n	0	0
41	Ontario	Oshawa Second Marsh	30M/15	n	n	n	0
31	Erie	Pinery Provincial Park	40P/5, 40P/4	n	n	n	0
40	Erie	Point Abino (west side)	30I/14	n	n	0	0
32	Erie	Point Pelee	40G/15	n	n	n	0
27	Huron	Port Albert North	40P/13	n	n	0	0
28	Huron	Port Albert South - Brindley	40P/13	n	n	0	0
35	Erie	Port Burwell Provincial Park	40I/10	n	n	n	0
23	Huron	Port Elgin	41A/6	n	n	0	0
43	Ontario	Presqu'île Provincial Park	30N/13, 31C/4	n	n	n	1
9	Huron	Providence Bay	41G/9	n	n	0	0
18	Huron	Red Bay/Howdenvale	41A/14	n	n	0	0

# 2006 Piping Plover Census

Table 1 (cont'd). Locations and numbers of Piping Plovers found in Ontario 1991, 1996, 2001 and 2006.

Map no.	Lake	Location	1:50,000 NTS <sup>1</sup> map sheet	Adults 1991	Adults 1996	Adults 2001	Adults 2006
34	Erie	Rondeau Provincial Park – S and SE Beaches	40I/5	n	n	0	0
4	LoW	Sable Islands Provincial Nature Reserve	52D/15	5	0	0	0
20	Huron	Sauble Beach – N	41A/11	n	n	0	0
21	Huron	Sauble Beach – S	41A/11	n	n	0	0
			41A/11,				
22	Huron	Southampton	41A/6	n	n	0	0
17	Huron	Stokes Bay	41A/14	n	n	0	0
10	Huron	Timber Bay	41G/9	n	n	0	0
37	Erie	Turkey Point	40I/9	n	n	n	0
			41A/9,				
15	Huron	Wasaga Beach Provincial Park	31D/12	n	0	0	0
			30N/13,				
44	Ontario	Wellers Bay National Wildlife Area	31C/4	n	n	n	0
	Huron	Western Duck Island <sup>4</sup> (NE shore)	41G/15	n	0	0	n
3	LoW	Windy Point	52D/15	0	3	1	1
	Totals			5	3	2	2

<sup>1</sup>NTS = National Topographic System

<sup>2</sup>n = not surveyed.

<sup>3</sup>LoW = Lake of the Woods.

<sup>4</sup> Located at 45° 45' 16" N - 82° 59' 38" W near Great Duck Island.



## The 2006 Piping Plover Census in Manitoba

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### Abstract

Eight adult Piping Plovers (*Charadrius melodus circumcinctus*) (four breeding pairs) were found in Manitoba during the 2006 International Piping Plover Census. A total of 20 surveyors covered 70 km of shoreline at 42 sites on eight different lakes during the 29 May to 26 June survey period. Piping Plovers were observed at only one site, Grand Beach Provincial Park on Lake Winnipeg, during the 2006 census. Above normal water levels that have persisted in many nesting lakes in Manitoba during the past decade, combined with increased vegetation encroachment at many former nesting sites on Lake Manitoba and Lake Winnipeg, has severely limited the amount of available nesting habitat in Manitoba and undoubtedly contributed to reduced nesting populations in recent years.

The first international census conducted in Manitoba in 1991 resulted in 80 adult plovers being located. Since then, the population has declined steeply from 60 to 16 adults in 1996 and 2001, respectively. The eight adults observed in 2006 represents a -90% decline from the 1991 census total, -87% from 1996 and a -50% less than the 2001 total. Despite the low numbers, improved stewardship and recovery efforts implemented in Manitoba since 2000 may eventually allow for the recovery of the species at former nesting sites. Protection of nests and guardian efforts to protect young plovers at Grand Beach resulted in very high productivity rates for the four nesting pairs in 2006. A total of 13 chicks fledged at Grand Beach in 2006 representing a record high productivity of 3.25 chicks/pair; much higher than the 1.25 chicks/pair called for in the recovery strategy for this subspecies. Efforts have also been made to rehabilitate some former nesting areas where nesting habitat has deteriorated due to vegetation encroachment in recent decades. But, unless water levels drop to expose more suitable nesting habitat at former nesting sites, the possibility of significantly increasing the current population in Manitoba does not look promising.

### Résumé

Huit pluviers siffleurs adultes (*Charadrius melodus circumcinctus*), soit quatre couples reproducteurs, ont été dénombrés au Manitoba au cours du recensement international des pluviers

siffleurs de 2006. En tout, 20 observateurs ont arpenté 70 km de côtes à 42 endroits autour de huit lacs différents du 29 mai au 26 juin. Au cours du recensement de 2006, on a pu voir des pluviers siffleurs à un seul endroit, soit au parc provincial Grand Beach sur le lac Winnipeg. Au cours des dix dernières années, le niveau d'eau qui est demeuré supérieur à la normale dans de nombreux lacs du Manitoba où le pluvier fait son nid, ainsi que l'empiètement accru de la végétation à l'emplacement d'anciennes aires de nidification autour des lacs Manitoba et Winnipeg, ont considérablement limité le nombre d'habitats de nidification disponibles dans la province et a sans aucun doute contribué à réduire les populations d'oiseaux nicheurs ces dernières années.

Dans le cadre du premier recensement international effectué au Manitoba en 1991, on avait observé 80 pluviers adultes. Depuis ce temps, la population a fortement chuté de 60 pluviers en 1996 à 16 en 2001. Les résultats obtenus pour le recensement de 2006, soit huit adultes, représentent une baisse de -90 % par rapport au recensement de 1991, de -87 % par rapport à celui de 1996 et de -50 % par rapport à celui de 2001. Malgré le faible nombre de pluviers, les activités de bonne intendance et de rétablissement menées au Manitoba depuis 2000 pourraient finalement permettre à l'espèce de se rétablir dans d'anciennes zones de nidification. Grâce à la protection des nids et au programme de tutelle visant la protection des jeunes pluviers à Grand Beach, les quatre couples reproducteurs ont enregistré un taux de productivité élevé en 2006. Au total, 13 oisillons ont survécu jusqu'à l'envol à Grand Beach en 2006, ce qui constitue un taux de productivité record de 3,25 oisillons par couple, un taux nettement supérieur à celui de 1,25 oisillon par couple à atteindre dans le cadre de la stratégie de rétablissement de cette sous-espèce. On a également déployé des efforts pour remettre en état d'anciennes aires de nidification, où l'habitat naturel s'était détérioré en raison de l'empiètement de la végétation au cours des dernières décennies. Toutefois, à moins que le niveau de l'eau ne baisse et que le pluvier ne puisse ainsi retrouver un habitat plus adapté dans les anciennes aires de nidification, la possibilité de voir croître de beaucoup la population actuelle au Manitoba semble très faible.

### Introduction

Piping Plover (*Charadrius melodus circumcinctus*) nesting populations have been monitored in Manitoba since 1981. From 1981 to 1986, Haig (1987) studied the population and life history patterns of Piping Plovers in southern Manitoba including sites at West Shoal Lake, Stony Beach, Twin Lakes Beach and Clandeboye Bay on Lake Manitoba, and Grand Marais on Lake Winnipeg. During this period, data were collected on mate and nesting territory retention, breeding success, dispersal patterns and genetic variability. Since 1987, Manitoba Conservation has been involved with monitoring and recovery efforts. Populations peaked at approximately 130 adults in 1988 (Koonz 1987-2001). Lower water levels on some nesting lakes, particularly West Shoal Lake,

resulted in reasonable numbers at most sites until the mid-1990s, but since then Manitoba's known nesting population has experienced a steady decline.

Because of the vast number of lakes where Piping Plovers could nest and the remoteness of many of these locations, annual monitoring efforts in Manitoba have often been incomplete. Increased effort has usually been expended during international census years, but even in those years coverage may have been insufficient to assess the true population of Piping Plover in Manitoba. The first international census was conducted in 1991, resulting in a total of 80 adult plovers being observed in Manitoba (Koonz 1991). Subsequent international censuses in 1996 and 2001 resulted in reduced totals of 60 and 16, respectively (Asmundson and Jones 1996; De Smet 2001). The biggest declines have occurred at West Shoal Lake where up to 67 adults were noted as recently as 1994 (Koonz 1987-2001), but unusually high water levels have resulted in all nesting habitat being inundated and birds have not been seen at this site since 1997. Declines in the quality of nesting habitat and in nesting Piping Plover populations have also been noted at several former nesting sites on Lake Manitoba and Lake Winnipeg. On these large lakes, increased stabilization of water levels since the 1960s is believed to have contributed to habitat loss due to vegetation encroachment at many former nesting sites. Flooding of nests due to slightly elevated water levels during the nesting season, increased human disturbance, and new or larger gull (*Larus* spp.) colonies near nesting sites have also been speculated as contributing factors for declining population trends on these lakes during this time period (Miller 2002, De Smet 2001).

What is still unclear is whether high water at some sites combined with declining habitat quality at others has resulted in a redistribution of the population to unknown nesting sites within Manitoba or to better nesting habitat in neighbouring provinces or states. In 2005, Manitoba Conservation conducted extended surveys in other potential nesting areas in the province aimed at finding unknown Piping Plover populations and to identify other sites with suitable nesting habitat within the province. Although no nesting plovers were found during the extended surveys in 2005, several sites were identified that had potential for nesting plovers, especially in drier years.

Protection and conservation of Piping Plovers in Manitoba was largely the responsibility of Manitoba Conservation until 1993 when a volunteer-based guardian program was established at Grand Beach to help protect the birds from the 200,000 plus people that visit this popular beach each summer. Based on a Piping Plover Guardian program from Prince Edward Island, the Manitoba Piping Plover Guardian Program sought to help protect the birds and increase public awareness about this endangered species (Fey 1993). The guardianship program continues today with funding from the Manitoba Special Conservation Fund and the federal Habitat Stewardship Program.

### Methods

To prepare for the 2006 international census, Manitoba Conservation conducted an extensive survey of habitat conditions at many remote or inaccessible sites where Piping Plovers might occur in Manitoba during the 2005 nesting season (Jones and Sylvestre 2005). Habitats of interest consisted of open sandy beaches or alkali flats with little or no shoreline vegetation. Using historical records, Geographical Information System analysis and reconnaissance flights, 192 sites were identified as having low, medium or high quality nesting habitat. A total of 77 sites with higher suitability rankings and ease of accessibility were visited to check for nesting plovers, to conduct habitat assessments, and to assess whether they should be revisited during the 2006 international census.

Forty-three sites (Figure 1) were selected for the 2006 International Piping Plover Census in Manitoba including 19 locations that were not included in previous international censuses. The 2006 international census committee also selected four sites from Manitoba (Albert Beach, Grand Beach, Sandy Bay and Twin Lakes Beach) which were surveyed twice within a 10-day period as part of a detectability study. The census was conducted from May 29 and June 26 with three sites (Gull Bay, Elk Island and Buffalo Point) surveyed outside the recommended June 3 to June 16 census date window due to accessibility and resource issues. Prior to the census, the census coordinator (Ken Porteous, Manitoba Conservation) arranged a meeting with the surveyors to assign site locations, and to elaborate on how to fill out the international census forms and a separate habitat assessment form designed by Manitoba Conservation to gather additional information on current habitat conditions and potential predator/human disturbances.

The majority of surveys were conducted by 1-2 people walking along specified sections of potential nesting beaches, but in a few locations where habitat was limited observations were made by boat (Hole-in-the-Wall, Little Moose Lake, Sturgeon Skin Point, Saskachayweow Bar and Hecla Island). Of 43 sites that were assigned to be surveyed in 2006, only the south spit at Gull Bay was not checked (due to high waves preventing boat access).

### Results

Twenty surveyors took part in the 2006 census covering a total of 70.1 km of shoreline at 42 sites on eight separate lakes (Lake Winnipeg, Lake Manitoba, Lake Winnipegosis, Lake of the Woods, Oak Lake, Salt Lake, Lawrence Lake and West Shoal Lake) (see Table 1). With the exception of Oak Lake and Lake of the Woods, high water levels were reported at all other lakes resulting in limited available nesting habitat for the 2006 breeding season.

Only one of the 42 locations surveyed in 2006 had any occurrences of Piping Plovers. Grand Beach, which is situated along the east shore of Lake Winnipeg, accounted for all eight birds (four breeding pairs) found in Manitoba during the 2006 census. Sites that had occurrences of plovers in 2001, but where none were observed in 2006 included Patricia Beach and the Gull Bay north and south spits on Lake Winnipeg, and Clandeboye Bay on Lake Manitoba.

### Discussion

Although the census effort increased significantly during the 2006 international census as compared to the 2001 census, when only 23 sites and 36.7 km of shoreline were surveyed, the low number of plovers seen during 2006 reflect a continuing decline in Piping Plover populations in Manitoba. The eight plovers counted in 2006 represent a -90% decline from the 80 birds observed during the first international census in 1991, a -87% decline from the 60 birds recorded in 1996, and a -50% decline from the 16 birds observed in 2001.

During the 1990s, West Shoal Lake was one of the main nesting sites in the province with 15 birds observed during the 1991 international census and 26 in 1996 (Koonz 2001; Asmundson and Jones 1996). The largest concentration of plovers at West Shoal Lake occurred in 1994 when 67 birds were observed (Jones 1994). Increased rain and spring runoff in the area has resulted in all former nesting areas on this lake being completely inundated since 1997. The second largest nesting site in Manitoba occurred at Gull Bay, near Grand Rapids on the mid-west shoreline of Lake Winnipeg, where 20 – 50 adult plovers were recorded annually from the late 1980s to mid-1990s (Miller 2002, Koonz 1987-2001). In 1994, part of the Gull Bay north spit was fenced off and designated as a Special Conservation Area to help protect breeding Piping Plovers from increasing human disturbance and all terrain vehicle (ATV) activity. Despite increased protection, numbers of nesting birds on the north and south spit have continually declined during international censuses from 38 birds in 1991, to 17 in 1996 and 3 in 2001 (Koonz 1991; Asmundson and Jones 1996; De Smet 2001). Although two birds were observed on the north spit in 2005 (Maconachie 2006), none were observed during 2006. Large gull and tern (*Sterna hirundo* and *Hydroprogne caspia*) colonies that have established on parts of the north and south spits, increased vegetation encroachment on upper beaches due to minimized water level fluctuations and water level stabilization of Lake Winnipeg over the past 40 years, slightly higher water levels, and continuing human presence nearby (perhaps with associated disturbance from ATVs) are most likely responsible for the birds declining at this site.

Although the number of Piping Plovers has declined substantially within the province in recent years, much effort has gone into the recovery of plovers since the 2001 international census. In 2002, a Manitoba Piping Plover Recovery Action Group was formed to oversee the protection



and conservation of Piping Plovers in Manitoba. Recovery actions designed to meet recovery goals defined in the recovery strategy for the Piping Plover (Environment Canada 2006) were implemented in the 2002 Manitoba Piping Plover Management Plan (Miller 2002) and later incorporated into a draft Manitoba Piping Plover Recovery Action Plan (Jones and Sylvestre 2006). Major activities have included an expanded volunteer guardian program to protect nesting plovers at Grand Beach, and providing additional protection to nests, nesting pairs and young through provision of predator exclosures, fencing, signs and public awareness. A Field Procedures Manual was developed in 2005 to outline proper techniques related to monitoring, protecting and collecting data on Piping Plovers in Manitoba (Sylvestre 2005).

Lastly, habitat restoration was carried out at two former nesting sites in an attempt to increase nesting pairs in the province. Some habitat restoration work was carried out at "Stony Beach" on Lake Manitoba and at Grand Marais on Lake Winnipeg in 2005 and 2006 to remove encroaching shoreline vegetation in segments of beach that were formerly occupied by nesting plovers. Grand Beach, the only remaining active nesting site in Manitoba that was active in 2006, has also experienced a noticeable increase in vegetation encroachment in recent years and is being considered for habitat rejuvenation work in the future.

Overall, recovery management techniques implemented since 2001 have been adjusted and improved each season. The results of these adjustments were realized in 2006 when all four pairs at Grand Beach were successful in raising young, and the 13 chicks that fledged resulting in a productivity rate of 3.25 chicks per nesting pair. It is hoped that the record high productivity from 2006, a return to more normal water levels on some of Manitoba's nesting lakes, expanded habitat restoration work, continued guardian efforts, and other stewardship initiatives will be enough to reverse declining trends of this species in Manitoba.

### Acknowledgements

The 2006 census would not have been possible without contributions from Manitoba Conservation staff and volunteers who participated in collecting data for the census. These include K. De Smet, K. Porteous, V. Trim, D. Roberts, B. Carey, L. Veelma, J. Swartz, C. Braden, H. Braden, B. de March, L. de March, T. Egan, P. Taylor, A. Reid, M. Yorke, C. Higgs, T. Merkl, A. Ens, and P. Friesen. Thanks to R. Jones for performing administrative duties on behalf of the Portage Natural History Group and to Manitoba Hydro for providing financial support for the 2006 census and for expanded surveys and habitat assessment conducted during 2005 to prepare for the 2006 census.

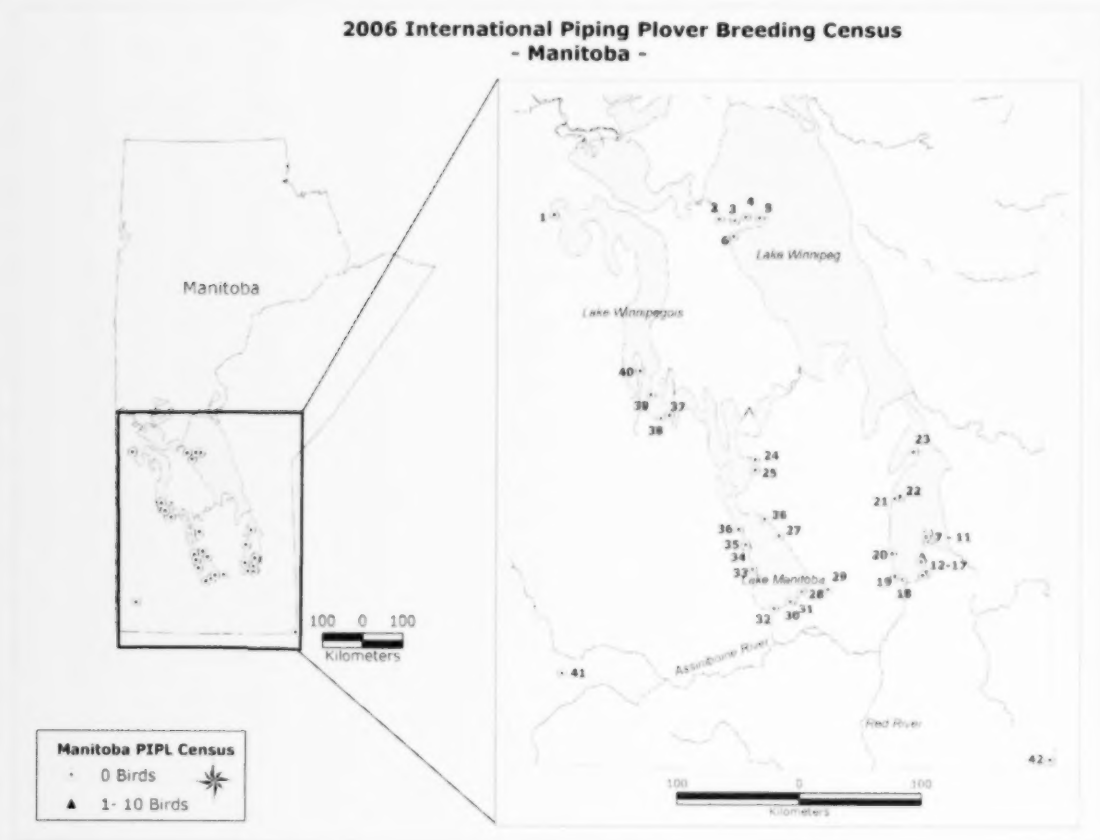


Figure 1. Location of sites censused in Manitoba during the 2006 International Piping Plover Breeding Census.

# 2006 Piping Plover Census

Table 1. Results of the 2006 International Piping Plover Breeding Census in Manitoba.

Map no.	Site name	Region	1:50,000 NTS <sup>1</sup> map sheet	2006 census								
				Date	No. of pairs	No. of adults	No. of surveyors	Distance surveyed (km)	No. of hours	Surveyed in 1991 census	Surveyed in 1996 census	Surveyed in 2001 census
9	Albert Beach <sup>2</sup>	Lake Winnipeg	62 I/10	14,15 June	0	0	1	2	1.25	No	No	Yes
17	Beaconia Beach	Lake Winnipeg	62 I/7	14 June	0	0	1	1.5	1	No	No	Yes
36	Big Sandy Point	Lake Manitoba	62 J/15	6 June	0	0	2	3	3	Yes	Yes	No
42	Buffalo Point	Lake of the Woods	52 E/3	26 June	0	0	2	0.5	1	No	No	No
19	Chalet Beach	Lake Winnipeg	62 I/7	13 June	0	0	2	1	0.5	No	No	No
31	Clandeboyne Bay	Lake Manitoba	62 J/1	8 June	0	0	1	1	1	Yes	Yes	Yes
32	Delta Beach	Lake Manitoba	62 J/1	15 June	0	0	2	1	1	No	No	No
8	Elk Island	Lake Winnipeg	62 I/15	22 June	0	0	2	5	6	Yes	Yes	Yes
26	Elm Point	Lake Manitoba	62 O/11	8 June	0	0	2	0.5	0.42	No	No	No
16	Grand Beach <sup>2</sup>	Lake Winnipeg	62 I/10	9,10 June	4	8	1	3	4.5	Yes	Yes	Yes
15	Grand Marais	Lake Winnipeg	62 I/10	10 June	0	0	1	1.5	0.5	No	Yes	Yes
6	Gull Bay	Lake Winnipeg	63 B/15	29 May	0	0	2	4	1.67	Yes	Yes	Yes
34	"Hall's Beach"	Lake Manitoba	62 J/10	6 June	0	0	2	0.1	0.5	No	No	No
35	"Hall's Homestead"	Lake Manitoba	62 J/10	6 June	0	0	2	1.5	1.5	No	No	No
22	Hecla Island	Lake Winnipeg	62 P/2	14 June	0	0	1	0.1	1	Yes	Yes	Yes
10	Hillside Beach	Lake Winnipeg	62 I/10	14 June	0	0	1	3	1	No	No	Yes
3	Hole-In-The-Wall	Lake Winnipeg	63 G/2	14 June	0	0	1	2.5	0.25	No	No	No
33	"Hollywood Beach"	Lake Manitoba	62 J/7	6 June	0	0	2	0.5	1	Yes	Yes	Yes
14	Island Beach	Lake Winnipeg	62 I/7	14 June	0	0	1	0.7	0.5	No	No	No
38	Lawrence Lake (Meadowlands)	Lawrence Lake	62 O/12	14 June	0	0	1	0	0.5	No	No	No
5	Little Moose Lake	Lake Winnipeg	63 G/2	14 June	0	0	1	3.5	1	No	No	No
27	Lundar Beach	Lake Manitoba	62 J/9	8 June	0	0	2	2.4	0.83	No	No	No
41	Oak Lake	Oak Lake	62 F/10	13 June	0	0	2	0.2	3.25	Yes	No	Yes
1	Overflowing River	Lake Winnipegosis	63 F/3	16 June	0	0	1	1	1.5	No	Yes	No
13	Patricia Beach	Lake Winnipeg	62 I/7	14 June	0	0	1	1.5	1	Yes	Yes	Yes



# 2006 Piping Plover Census

Table 1 (cont'd). Results of the 2006 International Piping Plover Breeding Census in Manitoba.

Map no.	Site name	Region	1:50,000 NTS <sup>1</sup> map sheet	2006 census						Surveyed in 1991 census	Surveyed in 1996 census	Surveyed in 2001 census
				Date	No. of pairs	No. of adults	No. of surveyors	Distance surveyed (km)	No. of hours			
18	Red River delta (Netley Marsh)	Lake Winnipeg	62 I/7	11 June	0	0	2	4	1.17	No	No	No
21	Riverton	Lake Winnipeg	62 I/15	3 June	0	0	2	1.7	2.75	Yes	Yes	Yes
40	Robinson Bay	Lake Winnipegosis	62 O/13	15 June	0	0	1	0.2	1	Yes	Yes	No
37	Salt Lake	Salt Lake	62 O/12	15 June	0	0	1	1.6	2.08	Yes	No	No
39	Salt Point (Long Island Bay)	Lake Winnipegosis	62 O/12,13	14 June	0	0	1	1.6	0.5	No	No	No
11	Sandy Bay <sup>1</sup>	Lake Winnipeg	62 I/10	14,15 June	0	0	1	2	0.25	No	No	Yes
2	Saskachayweow Bar	Lake Winnipeg	63 G/3	14 June	0	0	1	3.5	0.5	No	No	No
25	Silver Bay	Lake Manitoba	62 O/2	8 June	0	0	2	0.4	0.5	No	No	No
12	Steven's Island	Lake Winnipeg	62 I/10	10 June	0	0	1	2	1.5	No	No	No
30	"Stony Beach"	Lake Manitoba	62 J/1	3 June	0	0	2	2	0	No	No	No
4	Sturgeon Skin Point	Lake Winnipeg	63 G/3	14 June	0	0	1	3.5	1	No	No	No
28	Twin Lakes Beach <sup>2</sup>	Lake Manitoba	62 J/5	6,8 June	0	0	1	3	0.5	No	Yes	Yes
7	Victoria Beach	Lake Winnipeg	62 I/10	14 June	0	0	1	1	0.17	Yes	No	Yes
24	"Watchorn Beach"	Lake Manitoba	62 O/7	8 June	0	0	2	0.3	0.75	No	No	No
23	Wells Harbour	Lake Winnipeg	62 P/7	13 June	0	0	3	0.5	1	No	No	No
29	West Shoal Lake	West Shoal Lake	62 I/5	6 June	0	0	1	1.2	4	Yes	Yes	Yes
20	Willow Point	Lake Winnipeg	62 I/10	4 June	0	0	1	0.6	2.75	Yes	No	Yes
	Total				4	8		70.1	55.33			

<sup>1</sup>NTS = National Topographic System.

<sup>2</sup>Sites surveyed twice for international census detectability study.

## The 2006 Piping Plover Census in Saskatchewan

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### Abstract

The 2006 International Piping Plover Census in Saskatchewan took place from 28 May to 30 June with the majority of the surveys conducted from 3 to 16 June. A total of 1420 adults, including a minimum of 422 pairs (59.4%), were counted in Saskatchewan in 2006, the highest number counted since 1991. This is a +76.4% increase from 2001 (805 adults), a +5.3% increase from 1996 (1348 birds) and a +21.2% increase from 1991 (1172 birds). Only 86.6% of assigned sites were censused, in large part due to inclement weather, but the percentage of habitat censused was higher as most unsurveyed sites were small and/or were likely too dry or too wet to have habitat. The 158 surveyors covered 1808 km of shoreline on 299 sites. About 1325 km were considered to be Piping Plover habitat. This resulted in an average of 0.79 bird/km for the total shoreline distance covered, and 1.07 birds/Piping Plover habitat km. Piping Plovers were spotted at 69 (23.3%) of the 299 surveyed basins with the top four basins (Chaplin Lake, Big Quill Lake, Lake Diefenbaker and Old Wives Lake) providing 52.6% of the Saskatchewan total, and the top six sites (including Willow Bunch Lake and Manitou Lake) accounting for 61.3% of the population. Forty-seven Missouri Coteau basins accounted for 58.4% of the Saskatchewan total, the highest count and percentage ever found in the Missouri Coteau, as well as the largest number of occupied basins. In all census years (1991, 1996, 2001 and 2006), three to four basins accounted for about half the Saskatchewan Piping Plover population. In 2006, the top four sites plus the Missouri Coteau basins (counting Chaplin and Old Wives lakes only once) accounted for the majority of the Saskatchewan population, at 87.1% (1237 adults), compared to 74.7% , 83.3% and 85.0%, respectively, in 2001, 1996 and 1991. The number of Piping Plovers in Saskatchewan in 2006 accounted for an estimated 30.5% of the Northern Great Plains population (4662 birds), an increase of +3.2% from the 27.3% of 2001 (2953 birds), but down from 41.0% of the 1996 total (3286 birds), and 33.8% of the 1991 total (3469 birds). Efforts to protect the Piping Plover in Saskatchewan during the last five years may be responsible for the increased Saskatchewan population.

### Résumé

Le recensement international des pluviers siffleurs de 2006 en Saskatchewan s'est déroulé du 28 mai au 30 juin, la plupart des études ayant été réalisées du 3 au 16 juin. Au total, 1 420 adultes, dont un minimum de 422 couples (59,4 %), ont été dénombrés dans la province en 2006, ce qui constitue le nombre le plus élevé depuis 1991. Il s'agit d'une augmentation de +76,4 % par rapport à 2001 (805 adultes), de +5,3 % par rapport à 1996 (1 348 oiseaux) et de +21,2 % par rapport à 1991 (1 172 oiseaux). Seuls 86,6 % des endroits prévus ont fait l'objet du recensement, en grande partie en raison de la météo défavorable, mais le pourcentage d'habitats recensés était quand même supérieur, car la plupart des autres endroits étaient de petite taille ou risquaient d'être soit trop humides, soit trop secs pour abriter l'oiseau. Les 158 observateurs ont arpenté 1 808 km de côtes à 299 endroits. On a estimé à 1 325 le nombre de kilomètres constituant l'habitat du pluvier siffleur. On a observé en moyenne 0,79 oiseau par kilomètre pour la distance côtière parcourue et 1,07 oiseau par kilomètre d'habitat. On a repéré des pluviers siffleurs dans 69 des 299 bassins prospectés (23,3 %), les quatre bassins les plus importants (lac Chaplin, lac Big Quill, lac Diefenbaker et lac Old Wives) abritant à eux seuls 52,6 % de la population totale en Saskatchewan, et les six bassins les plus importants (y compris les lacs Willow Bunch et Manitou) abritant 61,3 % de la population. Les 47 bassins du Missouri Coteau représentaient 58,4 % de la population totale de la Saskatchewan, ce qui constitue le nombre le plus élevé et le meilleur pourcentage enregistré à cet endroit, ainsi que le plus grand nombre de bassins occupés. À chaque recensement (1991, 1996, 2001 et 2006), trois à quatre bassins abritaient environ la moitié de la population de pluviers siffleurs en Saskatchewan. En 2006, les quatre bassins les plus importants et les bassins du Missouri Coteau (les lacs Chaplin et Old Wives ne sont comptés qu'une seule fois) abritaient la plus grande partie de la population de la Saskatchewan avec 1 237 adultes (87,1 %); en 2001, 1996 et 1991, ces mêmes sites abritaient respectivement 74,7 %, 83,3 % et 85,0 % de la population. Le nombre de pluviers siffleurs en Saskatchewan en 2006 représentait environ 30,5 % de la population des Grandes Plaines du Nord (4 662 oiseaux), ce qui constitue une hausse de +3,2 % par rapport à 2001 (2 953 oiseaux, soit 27,3 %) et une baisse par rapport à 1996 (3 286 oiseaux, soit 41,0 %) et à 1991 (3 469 oiseaux, soit 33,8 %). Les mesures mises en place pour la protection du pluvier siffleur en Saskatchewan au cours des cinq dernières années pourraient expliquer la hausse de la population dans cette province.

### Introduction

The Piping Plover (*Charadrius melodus*) is a migratory shorebird that inhabits gravelly and sandy shorelines of central and eastern Canada, adjoining areas of the United States, and the U.S. Great Lakes. Unlike the majority of shorebird species which breed in the remote arctic and winter in

South America, the Piping Plover breeds and winters primarily in the temperate regions of North America. In 1945, this species began a decline that continued until recently. It was listed as threatened in 1978 by the Committee on the Status of Endangered Wildlife in Canada and in 1985 its status was upgraded to endangered (Haig 1985). In 2001, the two Piping Plover subspecies (*melodus* and *circumcinctus*) were listed separately as endangered in Canada (P. Goossen, pers. comm.).

In order to study population trends and to identify breeding habitats, the Canadian and U.S. Piping Plover recovery teams established international census guidelines to be followed every five years (Skeel 1991). The first complete census was undertaken in 1991, and the total population at that time was 5,484 birds, of which approximately 21.4% (1,172 birds) were located in Saskatchewan (Haig et al. 2005). A second international census occurred in 1996, and revealed the total count of plovers to be 5,931, with approximately 22.7% (1,348 birds) of the population occurring in Saskatchewan (Haig et al. 2005, Skeel et al. 1996). The third census in 2001 counted 5,945 Piping Plovers, a +0.2% increase from 1996, and +8.4% increase from 1991 (Haig et al. 2005). Saskatchewan, however, saw a -40.3% decrease in birds (805) in 2001 and accounted for only 13.5% of the total North American count (Dunlop 2001).

Goals of the 2006 census included providing essential insight into the population and migration trends of this species, and further highlighting important habitats for future conservation activities. Another goal was to assess detectability of Piping Plovers, and this was accomplished through resurveys of randomly selected basins. As a result of information collected during the previous three censuses, conservation and recovery efforts were initiated at a number of waterbodies important to plovers and some of these are discussed in this paper.

### Methods

The 2006 International Piping Plover Census in Saskatchewan took place from 28 May to 30 June with the majority of the surveys conducted during the official census period of 3 to 16 June. It is not expected that census results would be much affected by those sites surveyed outside the recommended census dates (3-16 June). Most of the breeding sites in Saskatchewan consist of shoreline and flat areas around alkali lakes, but shorelines of large freshwater lakes, river islands, reservoirs, and industrial ponds are also suitable. Nature Saskatchewan coordinated the Saskatchewan component of the 2006 International Piping Plover Breeding Census which covered 299 basins. However, due mostly to weather, 41 sites (of 299 sites) were surveyed outside these dates. Site selection for the Saskatchewan portion of the 2006 International Piping Plover Census was determined primarily through the analysis of previous international census results. The chosen sites were divided into three categories:

1. High Priority - included basins which had plovers during any past census;
2. Low Priority - included basins which did not have plovers during past censuses, but had suitable habitat; and
3. Missouri Coteau - included the multitude of small lakes and potholes found in this geographic region of southern Saskatchewan. This area includes both high and low priority basins. During May of the 1991 and 1996 censuses, aerial surveys were flown over the Missouri Coteau to determine which basins contained suitable habitat and should be surveyed. No such flights were undertaken within this area in 2001 or 2006.

Because of 2005 breeding records from the Canadian Wildlife Service (CWS), two sites were added to the 2001 list of survey sites: Pekakumew Lake and the Allan Potash Mine. Five sites were removed: two on CWS's recommendation as the habitat is no longer suitable (Kipling Marsh-historical record - and 'East of Perigord'); two north of the plover's normal range, with no previous records and a lack of a surveyor (Amisk and Jan lakes); and the upper South Saskatchewan River because of no previous plover sightings, cost and time involved.

Starting with high priority basins, all basins which had plovers or habitat during any past census were assigned to surveyors, except if permission was still denied, surveyors could not be found, or because of time and money constraints (Upper Saskatchewan River). In total, 158 surveyors participated in the census including government personnel, environmental agencies, contractors and volunteers. Both government and non-government agencies with experienced personnel were given a choice of the priority basins. These agencies provided valuable support surveying both priority water basins and others throughout the province. Larger basins with recent records of plovers were divided into manageable blocks and tendered out to qualified surveyors. Volunteers were enlisted to survey the remaining sites, which consisted primarily of smaller basins containing suitable habitat but no records (or no recent records) of plovers. Some volunteers also helped with the Lake Diefenbaker census. Surveyors were also asked to rate their survey experience.

Methodology remained consistent with the past Piping Plover censuses to ensure comparability of results. Survey protocol followed the methods used in 1991, 1996, and 2001 to ensure comparable results (see Hjertaas 2007). Assessment of habitat conditions was given special emphasis in order to provide the basis for future stewardship work with landowners. General survey guidelines were detailed in a methodology handout (Hjertaas 2007) and included the following points:

- suitable habitat of basin shoreline was to be surveyed wherever possible;
- surveyors were to report all observations of paired and unpaired adults; with Global Position System locations as much as possible
- surveyors were to restrict their time within any one plover territory to a maximum of five minutes;
- surveys were not to be conducted under extreme weather conditions;

- emphasis was given to high quality habitat (i.e., gravelly shorelines, beaches and areas where plovers were located previously); and
- where water levels had changed, new habitat was to be marked on 1:50,000 maps to facilitate future stewardship work.
- more precise information about time spent surveying and area of habitat covered was to be recorded.
- all landowners were to be contacted.

Sixty-six basins and six parts of larger basins were randomly selected by the international coordinator to be resurveyed for the detectability study, out of a total of 344 basins or sections of basins (20.9%). Surveyors resurveying basins were requested to complete the same forms as for a primary census (see Hjertaas 2007). Repeat data were also collected for 11 extra sites for a total of 83 (24.1%) of the above 344 locations. The study protocol called for both surveys of each basin to be done by the same surveyor and resurveyed within ten days of the original survey. That, however, was not possible for most basins because basin assignments were made prior to receiving the list of basins to be censused in the detectability study. Few basins were actually resurveyed within the planned 10 days. Additional surveys were made of several basins for the purpose of the detectability study or as part of other projects, but these survey results were not included as part of the international census results unless the original survey was not done.

In 2006, a major rain across the study area interrupted the census from 8-10 June and caused major changes of habitat from dry to normal water levels in the southern range of the Piping Plover breeding habitat. An examination of weather events during past censuses indicated that, except for 1991 in the northern range, 2006 was the first year when a major rainfall event interrupted the census.

### Results and Discussion

A total of 1420 adults were counted in Saskatchewan in 2006, including at least 422 breeding pairs (Table 1). This is a +76.4% increase from 2001 (805 adults), a +5.3% increase from 1996 (1348 birds) and a +21.2% increase from 1991 (1172 birds). Of the 1420 plovers counted in 2006, 59.4% were paired. This compares to 52.7%, 79.2% and 82.1% in 2001, 1996 and 1991, respectively. Piping Plovers were counted at 69 basins (Figure 1) with the number of birds ranging from one to 253 (Table 1). The number of pairs ranged from 0 to 74 with 55 sites having at least one pair (Table 1). The 2006 distribution map for Saskatchewan clearly illustrates the concentration of plovers at the highest count sites (Fig. 1).

Of the 321 sites assigned in Saskatchewan in 2006, 278 (86.6%) were surveyed. In addition to those, twenty-one "new" sites were surveyed, for a total of 299 sites surveyed. (Fig.1). Of the new sites, 14 showed potential for plover habitat and have been added to the list of potential basins. Seven



were deemed to have no potential for plover habitat. The remaining 43 assigned sites were not inspected due to misunderstanding (14), time (11), no access due to bad roads (4), weather (5), not finding landowners to ask permission (2), not finding sites (3), access denied (2) or simply missed (2) (see Hjertaas 2007).

The percent of actual habitat surveyed would be higher, as many of the sites that were not surveyed were unlikely to have had habitat in 2006. Due to extremely high water conditions throughout the northern area, it is unlikely that any of the 18 omitted basins would have hosted Piping Plovers in 2006. Of the 144 northern basins, 124 were visited. Of the 118 with water level information, 110 (93.2%) were noted with high, very high or overflowing water, including several with nesting Piping Plovers such as Big Quill, Manitou and Little Manitou lakes (73C/12). Of the 116 basins with habitat information, only 43 (37.1%) were reported with any habitat at all; only 24 (20.7%) had better than limited or marginal habitat. The northern basins began the year very full or overflowing (Hjertaas 2007), then were subjected to heavy rain from 8-10 June (35.5 mm), on 17 June (31.1 mm), and on 20-21 June (33 mm) (Hjertaas 2007). Although the extra water may have affected nesting outcome, it is unlikely to have affected the count due to the exceptionally high water conditions already present. Of the eighteen unsurveyed basins in the northern area (62M/11, 63 and 73 map sheets), only southeast Landis and the Allan Potash Mine had prior sightings of Piping Plovers. One bird was counted at southeast Landis in 1996 (Skeel et al. 1996), and six adults and one chick were observed at the Allan Potash Mine in 2005 (Westworth 2006). In 2006, the surveyor for the Allan Potash Mine, a mine employee, was doubtful there would be any birds this year due to the high water level in the ponds. Because the upper South Saskatchewan River had no sightings during past censuses, it was not included in the 2006 census and is unlikely to have had birds.

In the southern area, 25 assigned sites were not surveyed, and this likely did not significantly affect the count of Piping Plovers. Only two of these basins had ever had Piping Plovers reported previously. In addition, 43.8 % of the assigned basins surveyed before the 8-10 June rain were dry to nearly-dry (28 out of 64 basins). Grant Lake may have had a few birds, as it had one bird on all three previous international censuses and three in 2002 (Martens and Johns 2004), and unnamed basin UTM 850 814 had two birds in 1996 (Skeel et al. 1996). A complex of nine small basins in the Mapsheet 72H/1 area originally with access denied likely had no habitat early in the season; landowners indicated that everything was bone dry at least through April 2006. Considering the drought conditions prior to the 8-10 June rains, it is unlikely these basins would have filled up before 3 June. 'Coronach Reservoir' (Mapsheet 72H/3,4) has never had Piping Plovers (see Hjertaas 2007); rather it is East Poplar River 'Cookson reservoir'; SaskWater) with records in 1991 and 2001 (Skeel 1991, Dunlop 2001). Other unsurveyed basins have no past records.

The 158 surveyors who assisted in the census (64 volunteers, 10 contractors, and 84 government and nongovernment organization biologists including 16 summer students) covered 1808 km of shoreline, 1325.2 km of which was considered Piping Plover habitat. This results in 0.79 bird/km, and 1.07 birds per km per Piping Plover habitat km. This compares to 0.32 birds/km in 2001 and 0.62 birds/km in 1996. The results are not available for 1991. The habitat distance covered is less than determined in previous censuses, at 51.6% and 60.6% of the distance covered in 2001 and 1996, respectively (Hjertaas 2007). At least part of this discrepancy is due to the large number of basins with no available habitat in 2006 (too dry in the south and too wet in the north). In addition, there may be a difference in the way kilometers were counted.

Piping Plovers were spotted at 69 (23.3%) of the 299 surveyed basins (Table 1), with the top four basins (Table 2) providing 52.6% of the Saskatchewan total, and the top six sites accounting for 61.3% of the population. The Missouri Coteau basins (excluding Chaplin, Old Wives and Willow Bunch lakes) provided 29.9% of the total.

Five of the top basins above have supported major numbers of Piping Plovers in all past international censuses; Old Wives Lake has supported such large numbers only in 2006. Lake Diefenbaker (Sask Landing - Arms in all years) has supported the highest count of plovers in two years (1991 and 2001), and Big Quill Lake (1996) and Chaplin Lake (2006) each in one year (Hjertaas 2007).

In all census years, three to four basins accounted for about half the Saskatchewan Piping Plover population. In 2001, the top four sites (Lake Diefenbaker, Big Quill, Chaplin and Willow Bunch lakes) accounted for 56.2% of the population. In 1996 three sites (Big Quill, Chaplin and Willow Bunch lakes) accounted for 56.7% of the population denoting a more concentrated population that year while in 1991 the top four sites (Lake Diefenbaker, Big Quill, Manitou and Chaplin lakes) accounted for 55.3% of the population. In 2006, the top four sites plus the Missouri Coteau basins (counting Chaplin and Old Wives lakes only once) accounted for the majority of the Saskatchewan population at 87.1% (1237 adults), compared to 74.7%, 83.3% and 85.0% respectively in 2001, 1996 and 1991 (Hjertaas 2007).

The Missouri Coteau (excluding Chaplin, Old Wives and Willow Bunch lakes) had a combined total of 424 birds in 2006, 29.9% of the provincial total. By including Chaplin, Old Wives and Willow Bunch lakes, 829 birds (58.4% of the provincial total) were found in the Missouri Coteau this year. This compares to the Missouri Coteau supporting 36.7%, 51.0% and 39.1% (including all basins) of the provincial total in 2001, 1996 and 1991, respectively (Hjertaas 2007).

A total of 45 Missouri Coteau sites (excluding Chaplin and Old Wives lakes) hosted 490 plovers in 2006. This is the highest count and percentage ever found in the Missouri Coteau, as well as the largest number of occupied basins (39 sites in 2001, 43 in 1996 and 39 sites in 1991). The



number of Missouri Coteau sites with more than 10 Piping Plovers is at an all time high at 23. This is +91.6% more sites than in 2001 (12 sites), +64.3% more than in 1996 (14 sites) and +76.0% (13 sites) more than in 1991. Similarly, the number of sites with 20 or more Piping Plovers (13 sites) is also at an all time high at +333% more sites than in 2001 (3 sites), +44.4% more than in 1996 (9 sites), and +85.7% more than in 1991 (7 sites). The percentage of Missouri Coteau basins with 10 or 20 or more Piping Plovers is, however, only slightly higher, (48.9% and 27.7% respectively) than the 1991 data (44.8% and 24.1% respectively) (Hjertaas 2007).

Drought, flooding, predation and agricultural activities such as cattle, haying and cultivation (one basin in 2006) are affecting Piping Plover habitat and populations. In 2006, cattle and disturbance by people (mainly recreation) were the two most often recorded threats, followed by the presence of gulls (*Larus* spp.).

Saskatchewan is one of the last strongholds of the Piping Plover in the Northern Great Plains (Smith 1996). The 2006 International Piping Plover Census found a record number of Piping Plovers in Saskatchewan. The total of 1420 adults is higher than in any past census, especially in 2001 (an increase of 76.4%). Saskatchewan supported a high proportion of the Northern Great Plains plover population in all four years: 30.5% in 2006, an increase of +3.2% from the 27.3% of 2001 (2953 birds), but down from 41.0% of the 1996 total (3286 birds), and 33.8% of the 1991 total (3469 birds) (Haig et al. 2005). In 2006, Chaplin Lake accounted for 5.4% of the Northern Great Plains number, Big Quill Lake and Lake Diefenbaker for 4.4% each.

It is unlikely that the timing of 41 (of 301) sites surveyed outside the designated survey period would have significantly changed the Saskatchewan total. These sites comprised only a very small portion of the available plover habitat, and were primarily smaller sites with no habitat or past records of plovers. Important factors which may have affected Piping Plover numbers and survey results in 2006 include precipitation, water levels, vegetation growth, wind, timing of surveys and surveyor experience. During the first half of the census period, drought conditions prevailed across the Missouri Coteau and in the southwest of the province. Out of basins surveyed before the 8-10 June rain, 28 out of 64 (43.8%) were dry to nearly dry, and an additional 18 (28.1%) had very low to low water levels. The 8-10 June rain seems to have affected the establishment of birds in the southern range, which encompasses a major portion of the main breeding area (the Coteau hosted 59.1% of the plovers counted in 2006). The habitat changed dramatically before and after the rain from dry to low-normal water on several basins. Many birds were noted as present on previously dry basins only after the rain, but most basins with birds before the rain were not revisited to determine the fate of the nests after the rains. Some birds may also have been flooded out of basins that already had water before the rains, such as perhaps happened at unnamed basin UTM 430 164 (Mapsheet 72H/13) that went from 14 adults on 2 June (before the rain) to 8 adults on 13 June (after the rain), Notekeu Lake

(6 adults to 2), or unnamed basin UTM 735 128 (Mapsheet 72H/14) (1 adult to 0; likely little habitat before the rain). In previous years, late establishment (after rains) of Piping Plovers on some dry Coteau basins has also been noted (C. Gratto-Trevor, pers. comm.). Low water levels in recent successive years allowed vegetation to encroach upon beach areas. High winds during the survey period were noted by some surveyors as hindering their efforts by muting calls and making visual sightings more difficult. Mobbing by other shorebirds can be a hindrance or a blessing in disguise. Birds may also move between nesting and feeding areas, potentially causing some birds to be counted twice. Preliminary data from one study indicates that inexperienced surveyors tend to overcount birds, but that only about 66% of known nesting birds are ever seen in any one count (C. Gratto-Trevor, pers. comm.).

Effective management requires knowledge of migration and breeding chronologies, habitat use, food requirements and foraging modes. In order to achieve the ultimate goal of protecting the Piping Plover and its habitat, while increasing its fledgling rate, certain recovery actions need to be implemented. Cooperation of landowners, government, private agencies and an informed public are needed in order to mitigate concerns in Saskatchewan. Since the last census in 2001, Piping Plover management has focused primarily on the South Saskatchewan River system including Lake Diefenbaker.

The identification of Lake Diefenbaker through the international censuses as a site critical to the recovery of the Piping Plover and the cooperative efforts of several agencies has led to the development of a draft conservation plan, focusing on Lake Diefenbaker. The draft has been developed as an integrated action plan of stewardship and conservation activities, and includes management for increased plover productivity to mitigate the effects of rising water at this reservoir.

Current management efforts at Lake Diefenbaker include predator exclosures, clutch translocation and vegetation encroachment assessment (White 2006). Predator exclosures are used at Lake Diefenbaker to keep out predators such as gulls, skunks (*Mephitis mephitis*), dogs (*Canis familiaris*), raccoons (*Procyon lotor*), foxes (*Vulpes vulpes*) and American Crows (*Corvus brachyrhynchos*). Exclosing nests at Lake Diefenbaker is especially important to ensure successful first nestings before water level increases. Studies at Lake Diefenbaker have shown higher nest survival with exclosures (Saskatchewan Watershed Authority 2005, White 2006). In 2006, for instance, 10 of the 12 Lake Diefenbaker depredated nests were not exclosed. Predator exclosures may also help protect nests from people, their pets and recreational vehicles.

Moving clutches to higher ground is often sufficient to ensure nesting success of a number of pairs at Lake Diefenbaker and is preferentially used to captive-rearing. Model development showing the relationship of water levels to elevation of nests on shores has allowed for improved predictive

capacity to enable better identification of clutches at risk of flooding and allowing moving of these clutches to higher ground in a timely manner.

Emergency captive-rearing was undertaken on Lake Diefenbaker in 2002 and 2005 as a result of extreme flooding conditions (Goossen et al. 2002, Saskatchewan Watershed Authority 2005). Upon release, chicks received a generic band combination (2002) or an individual unique colour band combination (2005) which facilitates the evaluation of the project. Future evaluation includes determining juvenile survival, recruitment and productivity of captive-reared young.

In 2002, Nature Saskatchewan launched the Lake Diefenbaker Piping Plover Guardian Program to enhance plover productivity at this important site. Piping Plovers are in direct competition with people for open sand, sandbars and pebble beaches, especially in June and July and most importantly at Lake Diefenbaker because of its high recreational use. The initiation of this program is an important conservation action that resulted from Piping Plover research and conservation at Lake Diefenbaker over the past decade. The primary goal of the Guardian Program is to increase Piping Plover productivity through public awareness, education and conservation. Public awareness and education about the plover's recovery needs and habitat requirements is achieved through local school and provincial park presentations and activities. The Guardian Program assists Saskatchewan Watershed Authority (SWA) staff in conservation work in activities such as an annual census, nest monitoring, and erecting signage and symbolic fencing and to protect nests from beach visitors.

Trampling by cattle can result in damage to both chicks and nest sites. As well, chicks are occasionally unable to climb out of the deep footprints left by cattle. Action needs to continue in identifying problem sites and fencing off sensitive habitat to reduce disturbance and prevent further degradation of habitat. Although some fencing occurred following the 1991 census, no additional fencing for Piping Plover conservation occurred following the 1996 census. Since 2001, 29 projects to protect Piping Plover habitat from cattle impacts along shorelines have been realized in Saskatchewan by several agencies: 60.6 km of habitat has been fenced, 22 remote watering systems created, and changes were made for deferred grazing of Piping Plover habitat during the breeding season (SWA and Prairie Farm Rehabilitation Administration (PFRA), pers. comm.). Of these, SWA has been involved with 26 habitat enhancement projects at 17 basins over the last five years. The habitat enhancement projects are guided by the recommendations outlined in the Piping Plover conservation sites plans. These site plans include a biological assessment and recommendations for habitat improvement at 52 basins in Saskatchewan (MacDonald et al. 2003). PFRA of Agriculture and Agri-Foods Canada has been involved in other habitat enhancement projects.

Piping Plover research in Saskatchewan during the past five years has included a long-term population dynamics study carried out by CWS to assess plover survival. A radio-telemetry study at Chaplin Lake looked at detectability differences by using traditional and telemetry methods of

monitoring plover reproductive success (CWS, unpublished data). White (2005) examined nest attendance and reproductive success at Chaplin Lake. Surveys carried out by CWS (Martens and Johns 2004, Westworth and Schinke 2004) provided additional information on plover numbers as well as data related to movement of colour-banded birds banded in Saskatchewan.

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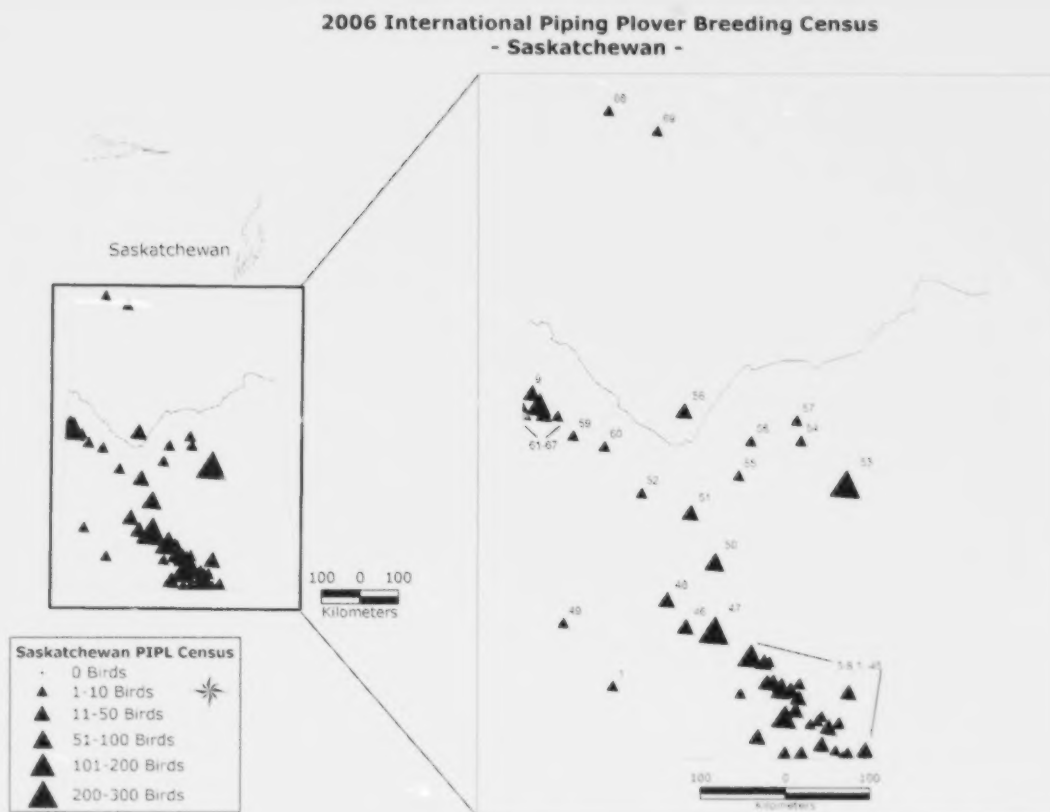


Figure 1. Location of sites with Piping Plovers censused in Saskatchewan during the 2006 International Piping Plover Breeding Census.



Table 1. 2006 International Piping Plover Breeding Census results for Saskatchewan.

Map no.	Site name	1:50,000 NTS <sup>1</sup> map sheet	UTM <sup>2</sup>	Date	No. of adults	No. of pairs	No. of observers	Distance surveyed (km)	Survey time (h)
1	Notukeu L. <sup>3</sup>	72F/9,16	966 140	12 June	6	3	1	9.6	2.25
2	unnamed basin	72G/9	150 065	14 June	2	1	2	2	1.00
3	<b>East Coteau L.<sup>4</sup></b>	72H/1	415 315	14 June	23	2	2	8	7.30
4	<b>Unnamed basin</b>	72H/1	<b>613 345</b>	7 June	1	0	1	2	1.00
5	<b>Big Muddy L.</b>	72H/2	090 430	7,13 June	12	4	3	80	9.13
6	<b>Sandoff L.</b>	72H/1	<b>615 375</b>	7 June	15	4	1	9	3.00
7	Jim Creek L.	72H/2	267 367	11 June	1	0	1	12	2.75
8	<b>Lonetree L.</b>	72H/2	355 290	5 June	3	1	1	7	0.83
9	<b>West Coteau L.</b>	72H/2,1	350 315	14 June	15	5	1	18.7	9.00
10	EPR- 'Cookson R.'*	72H/3	670 333	6 June	16	5	2	45	4.00
	'Crookstow R.'*	72H/3	685 318					0	
11	<b>Fife L.</b>	72H/4,5	370 520	8 June	27	10	1	16	3.00
12	<b>Willow Bunch L.</b>	72H/5,6	670 770	16 June	66	26	2	41.6	10.50
13	<b>Horizon L.</b>	72H/6,11	870 825	6 June	14	3	2	10	3.00
14	<b>Coal Mine L.</b>	72H/6	970 670	4 June	8	2	1	8	3.00
15	<b>Edna L.</b>	72H/7	060 725	6 June	2	0	2	6	1.50
16	Green L.	72H/7	114 781	7 June	2	1	1	2.1	1.50
17	<b>McGrath L.</b>	72H/7	185 646	7 June	12	5	2	4	1.30
18	<b>Salt L.</b>	72H/7	215 590	14 June	2	0	?	9.8	4.75
19	unnamed basin	72H/7	<b>304 706</b>	12 June	2	0	1	3.9	1.00
20	<b>Elsie L.</b>	72H/7	310 695	12 June	2	0	1	3.2	2.50
21	Marjorie L.	72H/7	315 684	5 June	3	1	2	3.8	1.75
22	<b>Dryboro L.</b>	72H/11	640 075	11 June	29	4	2	6	4.00
23	<b>Burn L.</b>	72H/11	660 070	11 June	8	2	2	7	2.00
24	unnamed basin	72H/11	662 075	19 June	1	0	1	0.45	0.16
25	unnamed basin	72H/11	684 062	19 June	2	1	1	3.2	2.00
26	<b>Unnamed basin</b>	72H/11	<b>705 056</b>	3 June	28	10	2	4.5	2.08
27	<b>Unnamed basin</b>	72H/11	<b>714 054</b>	3 June	2	0	2	1	0.50

Table 1 (cont'd). 2006 International Piping Plover Breeding Census results for Saskatchewan.

Map no.	Site name	1:50,000 NTS <sup>1</sup> map sheet	UTM <sup>2</sup>	Date	No. of adults	No. of pairs	No. of observers	Distance surveyed (km)	Survey time (h)
28	unnamed basin	72H/11	738 085	13 June	3	1	2	0.1	0.25
29	<b>Shoe L.</b>	72H/11	741 095	3 June	25	9	2	12.8	4.45
30	<b>Channel L.</b>	72H/11	825 855	6 June	21	7	2	6.4	3.00
31	<b>unnamed basin</b>	72H/11	<b>832 010</b>	12 June	2	1	1	1	0.42
32	<b>unnamed basin</b>	72H/11	<b>840 020</b>	12 June	10	2	2	3.5	1.60
33	<b>unnamed basin</b>	72H/11	<b>841 995</b>	5 June	4	2	1	3	1.45
34	<b>'Bunnyhug'</b>	72H/11	<b>842 027</b>	12 June	1	0	2	1.5	6.00
35	<b>'Prairie Chicken'</b>	72H/11	<b>846 992</b>	12 June	11	3	2	3.5	2.42
36	unnamed basin	72H/12	578 063	23 June	4	1	1	6	1.30
37	<b>Lake of the Rivers</b>	72H/12,13	475 190	4-5 June	23	4	2	22	16.0
38	<b>'Skull Lake'</b>	72H/13	430 164	13 June	8	1	2	6	2.00
								0	
39	<b>'Butterfly Lake'</b>	72H/13	<b>540 279</b>	4 June	12	4	1	4	3.08
40	<b>Bliss L.</b>	72H/13	633 135	13 June	18	6	2	11	5.75
41	<b>unnamed basin</b>	72H/14	<b>842 162</b>	7 June	4	2	1	2.5	0.75
42	unnamed basin	72H/14	848 171	16 June	2	0	2	0.5	0.50
43	<b>Frederick L.</b>	72I/4	435 425	6 June	21	3	3	17	2.50
44	<b>unnamed basin</b>	72I/4	<b>503 440</b>	6 June	2	0	1	2.4	0.50
45	<b>Old Wives L.</b>	72I/4;72J/1	300 480	6,7,9, 15 June	86	30	2	70	2.75
46	<b>Reed L.</b>	72J/6,7	<b>530 850</b>	3 June	21	8	4	22.4	1.00
47	<b>Chaplin L.</b>	72J/7,12, 8	860 840	14,18,1 9 June	253	74	6	50	?
48	<b>L. Diefenbaker 'Sask. Landing to Riverhurst'</b>	72J/11,12, 14,15	320 190	3,5-7 June	42	17	2-4/day 5 tot	0 97	127.00
49	<b>Freeflight L. unnamed basin</b>	72K/6 72O/2,1,7;	343 845	6 June	7	2	2	6 0	2.92
50	<b>L. Diefenbaker</b>	72J/15,16		3-7 June					



Table 1 (cont'd). 2006 International Piping Plover Breeding Census results for Saskatchewan.

Map no.	Site name	1:50,000 NTS <sup>1</sup> map sheet	UTM <sup>2</sup>	Date	No. of adults	No. of pairs	No. of observers	Distance surveyed (km)	Survey time (h)
	<b>'Riverhurst - Arms'</b>		860 620		162	62	12 total	113	129.30
51	<b>South Sask.</b>	72O/7.6.1 1,10,15		3,4, 14 June			6 total	0	
	<b>River 'Middle'</b>	72O/15;73 B/2	670 270		18	3	4 /day	105.9	31.83
52	<b>'N. of Valley Centre'</b>	72O/13	025 454	? June	2	1	1	4	1.00
53	<b>Big Quill L.</b>			3,4,6-8				0	
		72P/16.15 ;73A/1	440 470	13,16 June	204	42	2	80	?
54	<b>Houghton L.</b>	73A/6	940 080	3 June	1	0	2	0.3	8.00
55	<b>'NW of Blucher'</b>	73B/1	155 642	3 June	4	1	2	4.8	1.00
56	<b>Redberry L.</b>	73B/11	540 400	6 June	19	8	8	25	5.30
57	<b>Elkona L.</b>	73A/11	865 282	4 June	1	0	2	5	2.08
58	<b>Buffer L.</b>	73B/8;73 A/5	310 030	4 June	4	2	2	23	6.30
59	<b>Killsquaw Lakes</b>	73C/6	292 100	7 June	2	1	1	14	4.30
60	<b>Aroma L.</b>	73C/7	670 960	6 June	7	3	1	2	2.40
61	<b>Seagram L. (W.)</b>	73C/11	076 297	7 June	4	2	2	9.6	3.75
62	<b>Freshwater L. (S.)</b>	73C/12	690 290	5 June	18	3	2	3.9	3.60
63	<b>Freshwater L. (N.)</b>	73C/12	692 311	5 June	2	0	2	4.2	1.90
64	<b>Reflex Lks (E.)</b>	73C/12	712 371	13 June	2	1	1	11.8	5.16
65	<b>Little Manitou L.</b>	73C/12	935 308	15 June	13	6	1	18.3	6.41
66	<b>Reflex Lakes (W), SK</b>	73C/12;73 D/9	680 350	6 June	8	2	2	5	5.45
67	<b>Manitou L.</b>	73C/13,12	870 470	7-8 June	57	14	2	75.0	13.00
68	<b>Peter Pond L., Sandy Pt.</b>	73N/15	460 950	23 June	6	3	1	6.6	1.60

Table 1 (cont'd). 2006 International Piping Plover Breeding Census results for Saskatchewan.

Map no.	Site name	1:50,000 NTS <sup>1</sup> map sheet	UTM <sup>2</sup>	Date	No. of adults	No. of pairs	No. of observers	Distance surveyed (km)	Survey time (h)
69	Lac Ile-a-la Crosse	73O/5	200 385	23 June	2	1	1	0.8	0.83
Totals					1420	422		1184.2	

<sup>1</sup> NTS = National Topographic System<sup>2</sup> UTM = Universal Transverse Mercator system<sup>3</sup> Normal font indicates new basins with Piping Plovers in 2006.<sup>4</sup> Bold font indicates priority sites prior to 2006 census.<sup>5</sup> EPR – Cookson R. = East Poplar River – Cookson Reservoir which is the proper priority basin. See notes on name and UTM change in Hjertaas (2007).

Table 2. The top six Piping Plover sites in Saskatchewan listed in order of abundance, 2006.

Lake	No. of adults
Chaplin Lake	253
Big Quill Lake	204
Lake Diefenbaker	204
Old Wives Lake	86
Willow Bunch Lake	66
Manitou Lake	57

## The 2006 Piping Plover Census in Alberta

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### Abstract

The International Piping Plover Census has been conducted across North America every five years since 1991. This report summarizes information on populations counted during the Alberta portion of the census, and compares results to the three previous international censuses and a relatively complete survey conducted in the province in 1986 by Wershler and Wallis (1987).

The 2006 census involved 32 staff and volunteers who expended a total of 353.75 person-hours of effort to survey at least 460 km of shoreline at 71 lakes in Alberta. A total of 274 birds (84 pairs and 106 singles), were found on 25 lakes. This represents an +83% increase since 2001 (150 birds) and a similar count to that achieved in 1986 (288 birds) and 1996 (276 birds). The 10 lakes with the most plovers in 2006 supported 72% of the provincial total, with Muriel Lake supporting the highest numbers (46 birds), followed by Killarney (27), Birch (22), Handhills (17), "Reflex" (17), Red Deer (16), Baxter (15), Junction (14), Akasu (12), and Frog (12) lakes. The largest increases in plover numbers over 2001 census values occurred at Muriel Lake (+27) and Killarney Lake (+25). Substantial increases also occurred at Birch (Main Basin; +15), "Junction" (+14), Red Deer (+13), and Akasu (+10) lakes. Only "Reflex Lake" (-14) and Plain Lake (-12) incurred substantial decreases in Piping Plover numbers since the 2001 census. Thirty-two previously banded birds were observed during the census.

Inclement weather during early June meant that only 69% of surveys were completed during the recommended survey period of 3 to 16 June (the Alberta survey occurred from 25 May to 28 June). Weather conditions also prevented all but three of 13 (23%) pre-selected lakes being revisited for detectability. The increase in Piping Plover numbers observed during the 2006 international census may be in part attributed to extensive recovery efforts being implemented in the province since 2002.

### Résumé

Depuis 1991, le recensement international des pluviers siffleurs a lieu tous les cinq ans en Amérique du Nord. Le présent rapport résume le recensement de la population en Alberta et compare les résultats aux trois recensements internationaux précédents ainsi qu'à une étude relativement complète réalisée dans la province en 1986 par Wershler et Wallis (1987).

Le recensement de 2006 a mis en jeu 32 employés et bénévoles qui ont passé 353,75 heures-personnes à arpenter au moins 460 km de côtes autour de 71 lacs de l'Alberta. Au total, 274 pluviers (84 couples et 106 individus) ont été repérés dans 25 lacs. Cela constitue une hausse de +83 % depuis 2001 (150 oiseaux) et une relative stagnation par rapport à 1986 (288 oiseaux) et 1996 (276 oiseaux). Les dix lacs où l'on a trouvé le plus de pluviers en 2006 abritaient 72 % de la population totale de la province, le lac Muriel étant celui où l'on en a observé le plus avec 46 oiseaux. Suivent dans l'ordre les lacs Killarney (27), Birch (22), Handhills (17), Reflex (17), Red Deer (16), Baxter (15), Junction (14), Akasu (12) et Frog (12). Les lacs ayant connu les hausses les plus importantes du nombre de pluviers par rapport aux données obtenues lors du recensement de 2001 sont les lacs Muriel (+27) et Killarney (+25). On a également enregistré de fortes augmentations aux lacs Birch (bassin principal, +15), Junction (+14), Red Deer (+13) et Akasu (+10). Seuls les lacs Reflex (-14) et Plain (-12) ont connu une diminution importante du nombre de pluviers siffleurs depuis le recensement de 2001. On a observé, durant le recensement, 32 oiseaux bagués.

En raison de la météo défavorable qui a sévi au début du mois de juin, seules 69 % des études ont pu être réalisées durant la période d'étude recommandée du 3 au 16 juin (l'étude a été réalisée du 25 mai au 28 juin en Alberta). En raison des conditions météorologiques, seulement trois des 13 lacs présélectionnés (23 %) ont pu être réexaminés aux fins de détectabilité. L'augmentation du nombre de pluviers siffleurs observés au cours du recensement international de 2006 peut en partie s'expliquer par les considérables efforts de rétablissement déployés dans la province depuis 2002.

### Introduction

The Great Plains subspecies of the Piping Plover (*Charadrius melodus circumcinctus*) was listed as endangered in Canada in 1985 (COSEWIC 2001), and has been similarly listed in Alberta since 1997 (Prescott 1997). The species occurs over a relatively broad section of southeastern and south-central Alberta, but is sparsely distributed within that range. The Piping Plover has been the subject of management in the province since the mid-1990s, and particularly since 2002, when formal recovery efforts for the species were initiated (Alberta Piping Plover Recovery Team 2002, 2006). The provincial recovery goal is to support a minimum of 300 breeding birds in the province.

This will be achieved primarily through the protection and management of habitat, enhancement of nesting success, and information and extension initiatives.

The International Piping Plover Census was established in 1991 to provide a thorough inventory of populations on both the breeding and wintering grounds every five years. The primary function of the census is to gather data for monitoring population trends that can be used to assess recovery efforts in North America (Haig and Plissner 1993). Alberta has participated in the international census since its inception. The survey, in combination with provincial surveys that have been conducted on an annual basis since 2002 (Engley and Schmelzeisen 2002, Schmelzeisen and Engley 2003, Engley et al. 2004, Schmelzeisen et al. 2005), has been an important source of data for determining population trends and for identifying the distribution of breeding birds so that management actions can be effectively applied where needed. In general, the surveys to date have illustrated that populations are highly variable in size and distribution. Breeding populations in Alberta increased from 180 to 276 individuals from 1991 and 1996, although this increase was at least partly attributable to a large increase in the number of lakes surveyed (48 to 103; Hofman 1994, Bjorge 1997, Bjorge and Murphy 2004). A substantial decline was observed from 1996 and 2001, from 276 to 150 individuals with similar survey efforts (Prescott 2001). The majority of the Alberta population is generally found on fewer than 10 lakes in any one year, making the species particularly susceptible to disturbance.

This report documents the 2006 international census in Alberta. Results are compared to three previous international surveys, and to a relatively complete provincial survey of Piping Plovers in Alberta conducted in 1986 (Wershler and Wallis 1987), when 288 individuals were observed. These surveys collectively provide a profile of Piping Plover population trends and breeding distribution in this province over the past 20 years.

### Methods

The basic goal of the 2006 census in Alberta, and elsewhere, was to survey all breeding habitat known to be either currently or recently suitable for Piping Plovers in order to count breeding pairs and unpaired adults. We initially included all lakes surveyed during the 2001 census on the list of basins to be surveyed in 2006. However, most plover lakes in Alberta are now monitored on an annual basis, and it was known that some lakes that were suitable for breeding in earlier international censuses no longer contain suitable habitat. In addition, recent Piping Plover observations have been obtained at lakes not included in the 2001 (or any previous) census. Therefore, 56 lakes with unsuitable habitat that were surveyed in 2001 were not included, whereas 11 lakes where plovers have been observed since 2001 were added to the list. In all, 71 lakes (Figure

1) were targeted for ground surveys in 2006. The survey period throughout North America was set from 3 to 16 June.

The survey was coordinated by the Alberta Fish and Wildlife Division of Sustainable Resource Development. Fish and Wildlife staff prepared information packages for each lake, including a census form and instructions provided by the international Piping Plover census coordinator and a map of the lake, then assigned staff or volunteers to survey specific lakes. Whenever possible, lakes were surveyed by the same observer(s) who conducted surveys on previous censuses. Participants unfamiliar with field identification of Piping Plovers or their habitats were paired with more experienced observers, or were invited to observe plovers on lakes known to be occupied before conducting surveys on their assigned lakes.

Methodology for the field survey was established by the United States Geological Survey and Patuxent Wildlife Research Center (see Appendix 1). In brief, observers throughout North America walked shorelines and counted single or paired Piping Plovers, and were asked to record information such as weather conditions, types of habitats surveyed and occupied by plovers, distance traveled, and percentage of shoreline not surveyed. Observers were advised not to spend time looking for nests, but were asked to inspect all birds for the presence of colour bands. One addition to the protocol in 2006 was the request by the international coordinator to conduct repeat surveys on a subset of lakes. These duplicate surveys were intended to provide a measure of detectability of birds on the survey, and thereby provide better estimates of true population size. Random sites ( $n=13$ ) were selected to be surveyed twice following the same general methods as above. Surveyors were instructed to cover the same area on both surveys within a 10-day period.

### Results

A total of 71 lakes were surveyed during the 2006 census (Table 1), 49 (69%) of which were surveyed within the recommended survey period of 3 to 16 June. The earliest survey was conducted on 25 May, with all surveys being completed by 28 June (Table 1). The extended survey period was required because of inclement weather (extended periods of rain and/or wind) through much of the provincial range during the early part of June. The poor weather, in conjunction with extensive travel distances, almost negated attempts to conduct duplicate (detectability) surveys on selected lakes, because we deemed it more important to visit all lakes at least once before any duplicate surveys were attempted. Only three of the 13 (23%) pre-selected lakes were revisited. None of those lakes supported any plovers in 2006, so no useful information on detectability was gathered.

Thirty-two observers (see Acknowledgements) contributed 353.75 person-hours of survey effort in the province. These observers covered at least 460 km of shoreline by foot, boat, vehicle, or



all-terrain vehicle (Table 1). The percentage of suitable habitat not surveyed at the 71 lakes was likely very low since the larger water bodies that were surveyed, primarily reservoirs, had high water levels in 2006 and thus very little in the way of exposed gravel beaches. Further, 65 of the 71 (92%) lakes were reported as "survey complete" (i.e. % missed=0; Table 1).

A total of 274 birds (84 pairs and 106 singles), were found on 25 lakes during the 2006 census. The 10 lakes with the most plovers in 2006 supported 72% of the provincial total, with Muriel Lake supporting the highest abundance of plovers in the province (46 birds, 17% of the provincial total; Table 1). Other lakes with significant populations ( $\geq 10$  individuals) included Killarney (27), Birch (22), Handhills (17), "Reflex" (17), Red Deer (16), Baxter (15), "Junction" (14), Akasu (12), and Frog (12) lakes. The largest increases in plover numbers over 2001 census values occurred at Muriel Lake (+27) and Killarney Lake (+25, Table 2). Substantial increases ( $\geq 10$  individuals) also occurred at Birch (Main Basin: +15), "Junction" (+14), Red Deer (+13), and Akasu (+10) lakes (Table 2). Only two lakes incurred substantial decreases in Piping Plover numbers since the 2001 census: "Reflex Lake" (-14) and Plain Lake (-12) (Table 2).

Previously banded birds were observed on 32 occasions during the census and we were able to trace lake of origin for seven of those birds. One bird observed at Clarke Lake was originally banded at "Chain Lake #4"; one observed at Killarney Lake originally banded at Dowling Lake; one observed at Handhills Lake originally banded at "Chain Lake #4"; one observed at Killarney originally banded at "Reflex"; one observed at "Reflex" originally banded at Dowling; two birds observed at Muriel Lake were originally banded there. In addition, three birds previously banded in Saskatchewan were observed: one at Clarke Lake originally banded at Baxter Lakes, Alberta but subsequently re-banded at Lake Diefenbaker, Saskatchewan; one at Horseshoe Lake originally banded at Lake Diefenbaker; and one at Little Fish Lake originally banded at Dryboro Lake, Saskatchewan.

### Discussion

There have been five major surveys of Piping Plovers conducted at five-year intervals in Alberta over the past 20 years, as well as annual research, management, and population monitoring at key breeding areas in the province over the past decade (Prescott 1997; Alberta Piping Plover Recovery Team 2002, 2005, 2006; Engley and Schmelzeisen 2002; Schmelzeisen and Engley 2003; Engley et al. 2004; Schmelzeisen et al. 2005). These initiatives have steadily increased our understanding of the distribution of Piping Plovers and their habitat in Alberta, and resulted in an increasingly skilled group of observers to conduct censuses. The 2006 survey therefore achieved a relatively complete and comprehensive count of Piping Plovers in the province.

As in all previous surveys, the 2006 total of 274 birds is likely an underestimate. There undoubtedly remain a small number of lakes in the province that have not yet been surveyed, and which could support breeding birds. Further, since observers were specifically discouraged from searching for nests, many of the 106 single birds encountered during the survey could have been members of a breeding pair, which could increase the provincial population. However, given the standardized methodology used on all international censuses, it is unlikely that underestimates resulting from the counting of unpaired birds in 2006 was any different than in previous years. It is possible, however, that the overall detectability of birds on many surveyed lakes was higher in 2006 than in recent years, due to beaches on most lakes being narrower (and easier to survey) than usual. This occurred because of several years of dry conditions (accompanied by vegetation encroachment) in the first half of this decade, in combination with increasing water levels in late 2005 and early 2006. These conditions also resulted in an apparent decline in the overall availability of habitat in Alberta in 2006. Despite this, plover populations have rebounded substantially from the 2001 survey (150 individuals; Prescott 2001), and are now approaching levels seen during the 1986 (288 birds; Wershler and Wallis 1987) and 1996 (276 birds; Bjorge 1997, Bjorge and Murphy 2004) surveys. The rapid recovery of plovers is even more evident when considering that provincial populations hit a low of 134 individuals in 2004 (Engley et al. 2004).

The reason for the increase in plover populations in Alberta is not clear, but we believe that intensive management over the past few years has played a substantial role. Under the direction of the Alberta Piping Plover Recovery Team and two provincial recovery plans (Alberta Piping Plover Recovery Team 2002, 2006), substantial progress has been made on improving habitat availability and quality through stewardship agreements with landowners, input into industrial activities around plover lakes, and direct habitat improvement initiatives. Reproductive success has more than doubled through the province-wide deployment of predator exclosures in combination with various predator deterrence activities. Furthermore, information and education activities have increased public awareness and acceptance of plover management activities, and reduced human disturbance on beaches (Alberta Piping Plover Recovery Team 2005). These activities have improved the prospects of recovery for the Piping Plover in Alberta, and have undoubtedly contributed to population increases seen over the past few years. Alberta is committed to continuing these recovery activities. Ongoing monitoring, through annual surveys and participation in the International Piping Plover Breeding Census, will be a key activity for guiding management activities, and for tracking the progress of the anticipated recovery of this endangered species.



### **Acknowledgements**

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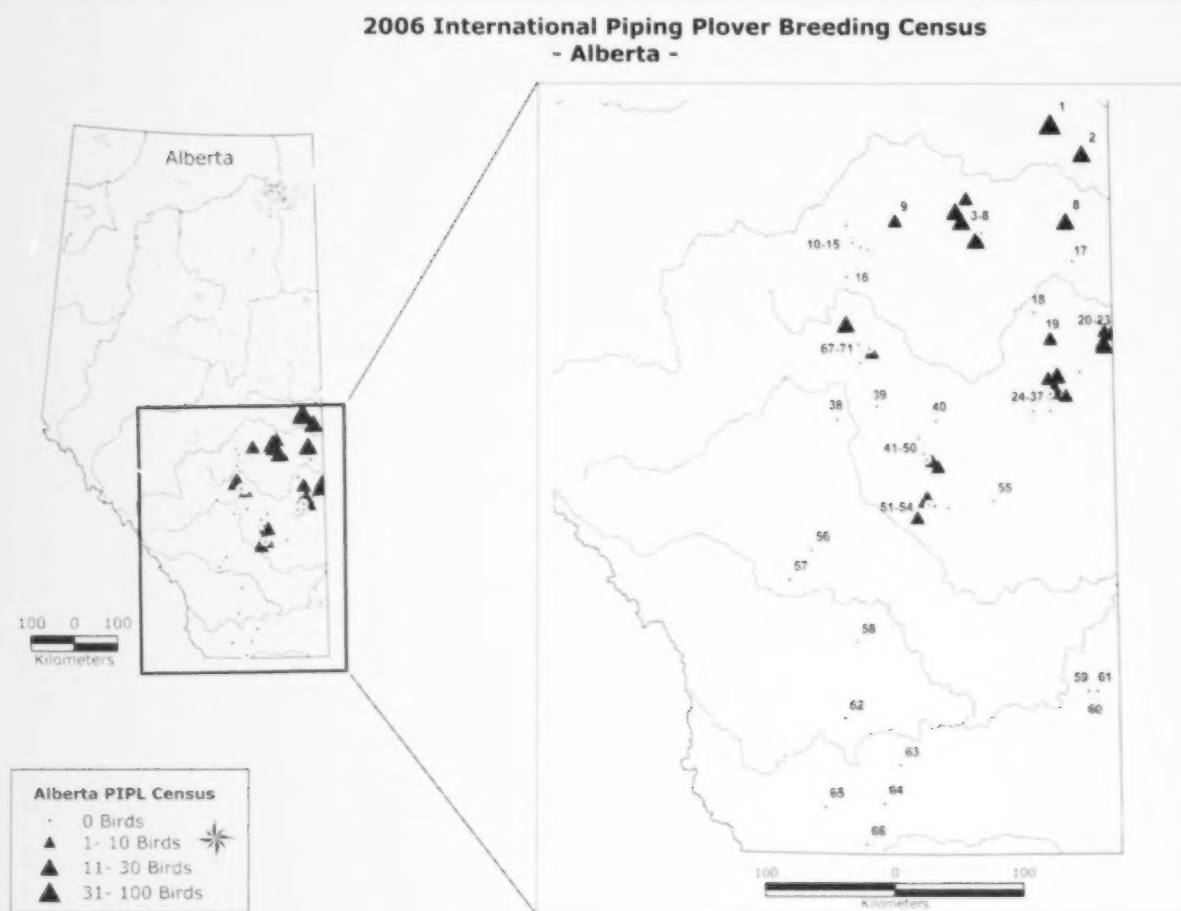


Figure 1. Location of sites censused in Alberta during the 2006 International Piping Plover Breeding Census.

Table 1. Results of the 2006 International Piping Plover Census in Alberta.

Map no.	Site name	1:50,000 NTS <sup>1</sup> map sheet(s)	Latitude (°N)	Longitude (°W)	Date	Person-hours	Shoreline surveyed (km)	% missed	No. of pairs	No. of singles	Total
5	Akasu Lake	73E/5	53.52	111.82	2 June	14.00	10.50	0	5	2	12
18	Albert Lake	73E/1	53.17	110.46	12 June	0.75	2.00	0	0	0	0
9	Baxter Lakes	73D/15	53.45	110.53	7 June	3.50	4.00	0	2	11	15
10	Beaverhill Lake	83H7.8,9,10	53.45	112.53	16 June	20.25	16.00	0	2	4	8
8	Birch Lake (Main basin)	73E/5	53.32	111.58	13, 19 June	5.75	7.00	0	10	2	22
7	Birch Lake (N basin)	73E/5	53.37	111.52	13 June	1.75	3.00	0	0	0	0
17	Bittern Lake	83H/3	53.05	113.08	6 June	3.50	8.00	0	0	0	0
20	Border Lake	73D/10	52.63	110.72	7 June	1.50	1.50	0	0	1	1
71	Buffalo Lake	83A/6,7,10,11	52.45	112.90	13 June	12.00	20.00	20	0	0	0
49	"Chain Lake 1" (Pearl L.)	82P/16	51.77	112.07	5 June	2.00	6.00	0	0	0	0
48	"Chain Lake 2"	82P/16	51.78	112.11	4 June	0.50	NA <sup>2</sup>	0	0	0	0
47	"Chain Lake 3" (Clear L.)	82P/16	51.78	112.13	4 June	1.00	3.40	0	0	0	0
46	"Chain Lake 3A"	82P/16	51.79	112.12	4 June	1.00	2.50	0	0	0	0
45	"Chain Lake 4"	82P/16	51.77	112.07	4 June	9.00	11.00	0	2	3	7
42	"Chain Lake 5"	82P/16	51.82	112.17	4 June	0.50	0.00	0	0	0	0
43	"Chain Lake 6"	82P/16	51.78	112.13	18 June	4.00	5.00	0	0	0	0
44	"Chain Lake 7"	82P/16	51.78	112.13	18 June	4.00	4.00	0	0	0	0
59	Chappice Lake	72L/1	50.15	110.35	19 June	6.00	5.60	0	0	0	0
63	Chin Coulee	72E/11	49.63	112.38	9 June	2.00	NA	0	0	0	0
21	Cipher Lake	73D/9	52.68	110.10	31 May	1.00	0.15	0	1	0	2
1	Clarke Lake	83K/2,7	52.25	110.68	1 June	1.50	1.50	0	1	7	9
53	Coleman Lake	72M/5	51.44	111.88	12 June	2.00	12.00	0	0	0	0
11	Cooking Lake	83H/6	53.41	113.10	15 June	3.50	2.20	0	0	0	0
57	Dalemead Lake	82I/13	50.92	113.63	6 June	2.67	10.40	0	0	0	0
56	Dawson Lake	82P/3	51.13	113.40	6 June	0.75	2.40	0	0	0	0
50	Dowling Lake	72M/12,13; 82P/9,16	51.73	112.00	2 June	25.00	33.00	0	3	2	8
32	"Foster Lake"	73D/2	52.23	110.55	14 June	2.00	6.70	0	1	0	2

Table 1 (cont'd). Results of the 2006 International Piping Plover Census in Alberta.

Map no.	Site name	1:50,000 NTS <sup>1</sup> map sheet(s)	Latitude (°N)	Longitude (°W)	Date	Person-hours	Shoreline surveyed (km)	% missed	No. of pairs	No. of singles	Total
3	Frog Lake	73E/16	53.92	110.33	9 June	7.50	46.00	0	4	4	12
33	Gooseberry Lake	73D/2	52.12	110.73	8 June	2.25	10.00	0	0	0	0
38	Goosequill Lake	83A/3	52.05	113.15	6 May	4.00	8.80	0	0	0	0
51	Handhills Lake	82P/8,9	51.50	112.12	3 June	15.00	13.00	0	5	7	17
25	Hansman Lake	73D/8	52.39	110.39	16 June	1.50	0.90	0	0	0	0
28	Horseshoe Lake	73D/7	52.35	110.75	7 June	10.00	11.00	0	3	2	8
12	Joseph Lake	83H/6	53.29	113.07	15 June	3.50	11.00	0	0	0	0
6	"Junction Lake"	73E/5	53.45	111.75	5 June	3.50	6.20	0	7	0	14
62	Keho Lake	82H/14,15	49.95	112.98	20 June	1.33	NA	NA	0	0	0
22	Killarney Lake	73D/9	52.58	110.10	8 June	13.00	11.20	0	5	17	27
54	Little Fish Lake	82P/8	51.37	112.23	5 June	5.00	6.00	0	2	0	4
39	Lowden Lake	83A/2	52.15	112.70	7 June	1.50	7.50	0	0	0	0
58	McGregor Lake	82I/7,10	50.49	112.87	6 June	2.00	3.50	NA	0	0	0
29	"McLaren Lake" <sup>3</sup>	73D/7	52.29	110.68	4 June	4.50	4.50	0	3	0	6
26	"Metiskow Lake"	73D/7	52.40	110.63	16 June	0.67	2.50	0	0	0	0
64	Milk River Ridge Reservoir	82H/7	49.36	112.54	9 June	3.50	2.00	0	0	0	0
15	"Miquelon Lake #1"	83H/2	53.21	112.83	1 June	1.00	2.00	0	0	0	0
16	"Miquelon Lake #2"	83H/2	53.24	112.84	25 May	3.00	3.20	0	0	0	0
14	"Miquelon Lake #3"	83H/2,7	53.26	112.92	25 May	6.00	7.00	0	0	0	0
19	Mott Lake	73D/15	52.81	110.91	7 June	10.50	5.00	0	0	0	0
2	Muriel Lake	73L/2	54.13	110.70	10 June	38.50	10.00	0	7	32	46
37	"Neutral Hills A"	73D/2	52.07	110.93	19 June	1.00	4.60	0	0	0	0
36	"Neutral Hills B1"	73D/2	52.08	110.95	19 June	1.00	10.00	0	0	0	0
35	"Neutral Hills B2"	73D/2	52.10	110.97	19 June	1.25	9.80	0	0	0	0
34	"Neutral Hills C1"	73D/2	52.12	110.93	19 June	NA	NA	NA	0	0	0
23	"NW Killarney Lake"	73D/9	52.60	110.12	28 June	2.00	4.00	0	3	0	6
13	Oliver Lake	83H/6	53.29	113.02	26 May	5.00	4.55	0	0	0	0
30	"Piper Lake"	73D/7	52.36	110.63	4 June	2.00	1.40	0	2	2	6

Table 1 (cont'd). Results of the 2006 International Piping Plover Census in Alberta.

Map no.	Site name	1:50,000 NTS <sup>1</sup> map sheet(s)	Latitude (°N)	Longitude (°W)	Date	Person-hours	Shoreline surveyed (km)	% missed	No. of pairs	No. of singles	Total
4	Plain Lake	73E/12	53.61	111.70	14 June	1.25	4.50	0	0	1	1
55	Plover Lake	72M/6	51.49	111.38	19 June	1.00	NA	NA	0	0	0
67	Red Deer Lake	83A/10,11,14	52.72	113.07	18 June	10.00	7.00	0	8	0	16
24	"Reflex Lake"	73D/9	52.67	110.00	6 June	11.50	10.70	0	6	5	17
69	"Rider Lake"	83A/10	52.53	112.77	6 June	2.00	4.00	0	0	1	1
70	Rockeling Bay	83A/10	52.55	112.80	5,6 June	2.00	3.50	0	0	0	0
60	Rutherford Lake <sup>3</sup>	72L/1	50.13	110.28	20 June	4.00	3.20	0	0	0	0
61	Sam Lake	72L/1	50.15	110.25	20 June	6.00	5.60	0	0	0	0
66	Shanks Lake	82H/2	49.07	112.72	2,19 June	6.33	2.25	0	0	0	0
68	Sittingstone Lake	83A/10	52.58	112.92	6 June	16.00	8.00	0	0	0	0
41	Spiers Lake	82P/16	51.93	112.23	7 June	2.00	4.00	0	0	0	0
65	St. Mary Reservoir	82H/6	49.33	113.17	9 June	1.00	NA	NA	0	0	0
40	Sullivan Lake	72M/13; 73D/4; 82P/16; 83A/1	52.05	112.03	7 June	5.00	20.00	0	0	0	0
27	Sunken Lake Unnamed (S of Handhills L.)	73D/7	52.38	110.65	7 June	2.00	1.20	0	2	3	7
52	"West Lake"	82P/8	51.46	112.10	3 June	1.00	1.00	0	0	0	0
31		73D/2	52.24	110.73	8 June	1.25	4.30	0	0	0	0

<sup>1</sup>NTS = National Topographic System<sup>2</sup>NA = not applicable.<sup>3</sup>"McLaren Lake" was formerly called "Unnamed SE of Capt. Eyre Lake"; <sup>2</sup>Rutherford Lake was formerly called "Unnamed SE of Sam Lake".

Table 2. Comparison of Piping Plover populations at all Alberta lakes surveyed in 2006 with previous provincial censuses at those lakes, when they occurred.

Lake	Total no. birds					Numerical change			
	1986	1991	1996	2001	2006	1986- 1991	1991- 1996	1996- 2001	2001- 2006
Akasu Lake			10	2	12			-8	+10
Albert Lake			2	6	0			+4	-6
Baxter Lakes	0	2	2	6	15	+2	0	+4	+9
Beaverhill Lake	0		13	0	8			-13	+8
Birch Lake (Main basin)			14	7	22			-7	+15
Birch Lake (N basin)			5	0	0			-5	0
Bittern Lake	0		2	0	0			-2	0
Border Lake					1				
Buffalo Lake	2	0	0	0	0	-2	0	0	0
"Chain Lake #1" (Pearl Lake)	0	2	0	4	0	+2	-2	+4	-4
"Chain Lake #2"	0			0	0				0
"Chain Lake #3" (Clear Lake)	1	2	0	0	0	+1	-2	0	0
"Chain Lake #3A"	0	0	0	0	0	0	0	0	0
"Chain Lake #4"	12	5	13	5	7	-7	+8	-8	+2
"Chain Lake #5"	0		0	0	0			0	0
"Chain Lake #6"	1	2	0	0	0	+1	-2	0	0
"Chain Lake #7"	0	0	0	0	0	0	0	0	0
Chappice Lake	17	2	1	0	0	-15	-1	-1	0
Chin Coulee					0				
Cipher Lake	4	4	4	0	2	0	0	-4	+2
Clarke Lake					9				
Coleman Lake				0	0				0
Cooking Lake					0				
Dalemead Lake					0				
Dawson Lake					0				
Dowling Lake	18	21	54	4	8	+3	+33	-50	+4
"Foster Lake"	6		2	4	2			+2	-2
Frog Lake				3	12				+9
Gooseberry Lake	4	9	0	0	0	+5	-9	0	0
Goosequill Lake	2	0	0	0	0	-2	0	0	0
Handhills Lake	37	20	54	9	17	-17	+34	-45	+8
Hansman Lake	0			6	0				-6
Horseshoe Lake	2	0	6	0	8	-2	+4	-6	+8
Joseph Lake			0	0	0			0	0
"Junction Lake"			2	0	14			-2	+14
Keho Lake		3	1	0	0		-2	-1	0
Killarney Lake	0	22	23	2	27	+22	+1	-21	+25
Little Fish Lake	23	19	0	3	4	-4	-19	+3	+1
Lowden Lake	0	0	0	0	0	0	0	0	0
McGregor Lake			0	0	0			0	0

Table 2 (cont'd). Comparison of Piping Plover populations at all Alberta lakes surveyed in 2006 with previous provincial censuses at those lakes, when they occurred.

Lake	Total no. birds					Numerical change			
	1986	1991	1996	2001	2006	1986- 1991	1991- 1996	1996- 2001	2001- 2006
"McLaren Lake" <sup>1</sup>				5	6				+1
"Metiskow Lake"		2	2	0	0		0	-2	0
Milk River Ridge Reservoir					0				
"Miquelon Lake #1"			1	0	0			-1	0
"Miquelon Lake #2"	0	0	0	0	0	0	0	0	0
"Miquelon Lake #3"		0	0	0	0		0	0	0
Mott Lake					0				
Muriel Lake			17	19	46			+2	+27
"NW Killarney Lake"			2	0	6			-2	+6
"Neutral Hills A"	12	2	0	0	0	-10	-2	0	0
"Neutral Hills B1"	4	0	2	0	0	-4	+2	-2	0
"Neutral Hills B2"	0	0	0	0	0	0	0	0	0
"Neutral Hills C1"	6	5	5	0	0	-1	0	-5	0
Oliver Lake	0		0	0	0			0	0
"Piper Lake"	15+	12	6	2	6	-3	-6	-4	+4
Plain Lake				13	1				-12
Plover Lake	0		0	6	0			+6	-6
Red Deer Lake	0		2	3	16			+1	+13
"Reflex Lake"	46+	12	19	31	17	-34	+7	+12	-14
"Rider Lake"	15	7	0	0	1	-8	-7	0	+1
Rockeling Bay	18	6	0	0	0	-12	-6	0	0
Rutherford Lake <sup>2</sup>	1	0	0	0	0	-1	0	0	0
Sam Lake	6+	4	2	0	0	-2	-2	-2	0
Shanks Lake			0	0	0			0	0
Sittingstone Lake					0				
Spiers Lake	6	2	0	0	0	-4	-2	0	0
St. Mary Reservoir			3	2	0			-1	-2
Sullivan Lake	0		0	0	0	0		0	0
Sunken Lake	5+	8	7	6	7	+3	-1	-1	+1
Unnamed (S of Handhills L.)				0	0				0
"West Lake"					0				

<sup>1</sup>"McLaren Lake" was formerly called "Unnamed SE of Capt. Eyre Lake".<sup>2</sup>Rutherford Lake was formerly called "Unnamed SE of Sam Lake".



## Piping Plover Conservation in Canada (2001-2006)

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Long-term monitoring is essential to assessing the status, distribution and trends of wildlife populations. The International Piping Plover (*Charadrius melodus*) Census is the longest running shorebird census in North America to cover nearly the entire breeding range of a single species. The geographical coverage of the census on both the breeding and wintering grounds has also widely heightened public and conservation agencies awareness about the plover. Four censuses (Flemming 1994, Goossen and Amirault 2004, Amirault 2005, Haig et al. 2005, Elliott Smith et al. 2009, this paper), during a period of 16 years, have provided a wealth of information important to Piping Plover population assessment and management. Even with this volume of data, it is evident that more censuses are required to assess the long-term population trend of this species. Also, to better interpret any trends, recovery managers need to determine what effect detectability of plovers has on count outcomes. Changes in census numbers may not necessarily reflect population changes if detectability is a factor. The global estimate of Piping Plovers in 2006 was 8092 adults of which approximately 27% occurred in Canada (Elliott-Smith et al. 2009). The 2006 count was the highest of the four censuses carried out to date with previous international counts ranging from 5484 to 5945 adult Piping Plovers (Haig et al. 2005).

## 2006 International Piping Plover Breeding Census Overview for Canada

Canada's fourth national census (2006) of Piping Plovers resulted in a count of 2164 (Table 1). The 2006 count was the highest to date for Canada and was 49% higher than the previous census

## 2006 Piping Plover Census

in 2001. The region which influenced the 2006 count the most was Prairie Canada which had a 75% increase in its numbers. Eastern Canada, however, showed a slight decline (-4%) from the 2001

Table 1. International Piping Plover Breeding Census results from Canada and France's St. Pierre et Miquelon islands 1991-2006 (Data from Amirault 2005, Haig et al. 2005 and this report).

Location	1991	1996	2001	2006	Change (%) 1991-1996	Change (%) 1996-2001	Change (%) 2001-2006	Change (%) 1991-2006
<b>Eastern Canada</b>	509	422	481	460	-17	-14	-4	-10
Newfoundland	7	27	39	48	+286	+44	+23	+586
Québec	76	104	70	63	+37	-33	-10	-17
Prince Edward Island	110	66	112	95	-40	-70	-15	-14
New Brunswick	203	146	167	167	-28	+14	0	-18
Nova Scotia	113	79	93	87	-30	-18	-6	-23
<b>France</b>	4	6	9	8	+50	+50	-11	+100
St. Pierre et Miquelon	4	6	9	8	+50	+50	-11	+100
<b>Great Lakes</b>	0	1	1	1	-	0	0	-
Ontario	0	1	1	1	-	0	0	-
<b>Prairie Canada</b>	1437	1687	972	1703	-17	-42	-75	-19
Ontario	5	3	1	1	-40	-67	0	-80
Manitoba	80	60	16	8	-25	-73	-50	-90
Saskatchewan	1172	1348	805	1420	+15	-40	-76	-21
Alberta	180	276	150	274	+53	-46	-83	-52
<b>Totals</b>								
France	4	6	9	8	+50	+50	-11	+100
Canada	1946	2110	1454	2164	-8	-31	-49	-11
Grand total	1950	2116	1463	2172	+9	-31	-48	-11

count. This decline may in fact be negligible when considering that detectability is imperfect. In Eastern Canada, Newfoundland continued to report an increase in its numbers (+23%). The 48 adults counted represent the highest number of Piping Plovers counted in the province during the four international censuses. The New Brunswick census was -18% lower than in 1991 but the same as the count in 2001. Counts in Québec and Prince Edward Island were down -17 and -14%, respectively from the 1991 census. The decrease in numbers reported in Québec may be partially explained by a difference in reporting methodology as compared to past years. The greatest count decline from 1991, however, occurred in Nova Scotia where plover numbers dropped by -23%. The most pronounced decline occurred in the southern part of the province.

Piping Plovers are rarely seen in the Canadian portion of the Great Lakes and the 2006 count of a single bird demonstrates that reality. Only single birds were seen in the Canadian Great Lakes region during all four international censuses except in 1991 when none were counted (Table 1). In Prairie Canada, 2006 counts in Saskatchewan and Alberta increased by +76 and +83%, respectively compared to 2001. Piping Plover numbers in the northeastern periphery of the Northern Great Plains (NGP) range (Manitoba and Ontario) declined to near extirpation levels.

### Piping Plover counts in Canada (1991-2006)

With the exception of a drop in Piping Plover numbers in 2001, the Canadian count has been relatively stable between 1946 and 2164 adults (Figure 1). Overall, the number of Piping Plovers counted during the 2006 international census has increased +11% relative to 1991 (Table 1).

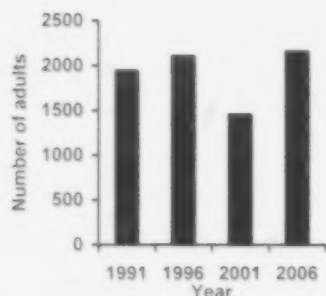


Figure 1. International census results for Piping Plovers in Canada, 1991-2006.  
(Data from Amirault 2005, Amirault 2005, Haig et al. 2005 and this report).

The -31% decline from 1996 to 2001 for Canadian Piping Plovers came exclusively from Prairie Canada which declined by -42% while Eastern Canada numbers increased by +14%. Although the Prairie Canada count declined in 2001, the U.S. NGP count increased by +24% (Haig et al. 2005). One explanation suggested to explain this change is that plovers may have short-stopped in the U.S. or abandoned Canadian sites for U.S. sites due to habitat conditions in Canada (Haig et al. 2005). Recent banding studies, however, suggest there is little movement of plovers between Prairie Canada and the U.S. NGP (C. Gratto-Trevor, pers. comm.).

Regionally, Eastern Canada estimates (Figure 2) were lower in 2006 compared to 1991 (-10%). This decline occurred despite consistently high productivity reported throughout this period, including a nearly a +600% increase in the Newfoundland count from seven to 48 birds (Table 1; Figure 3) during the same period. Increased efficiency and effort partially explain Newfoundland's high 2001 count (Thomas and Etcheberry 2005). The number of Piping Plovers on the French islands of St-Pierre-et-Miquelon has doubled from four adults in 1991 to eight in 2006 and reached a

high of nine in 2001. But in the Maritimes and Québec, the story is different. Nova Scotia's plover numbers underwent the greatest population decline (-23%) of the eastern provinces since 1991, with a great decrease noted in southern Nova Scotia. Counts in the remaining Maritime provinces and Québec showed decreases from -14 to -18%. Census results for eastern Canada continue to be lower

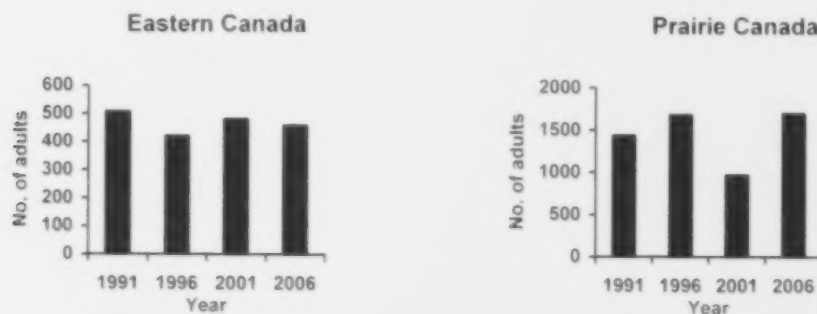


Figure 2. Population counts of Piping Plovers in Eastern Canada and Prairie Canada, 1991-2006. (Data from Haig et al. 2005 and this report).

than anticipated. Consistently high productivity levels are estimated annually in this very well monitored population (85% or more of the total number of nesting pairs are monitored annually to determine productivity). Mean productivity for pairs monitored (chicks fledged per pair) during the period 2002-2006 are as follows: 1.18 (2002), 1.62 (2003), 1.93 (2004), 1.72 (2005) and 1.8 (2006).

Threats that could be responsible for the lack of recovery in this eastern population unit may be acting outside the nesting grounds. The winter portion of the international census continues to be a challenge. Many sites used by Piping Plovers during the non-breeding season have been identified through this effort, however, information on the distribution of eastern Canada Piping Plovers during the non-breeding season is incomplete. Additionally, the winter census revealed that a large population of Piping Plovers winter in the Bahamas and the Caribbean, yet coverage in this region was incomplete. The lack of anticipated population increase experienced in the eastern Canada population demonstrates the need for greater effort in identifying and securing significant non-breeding habitats, including both wintering and migration habitat, from destruction or disturbance. This would result in a more comprehensive approach to recovery which complements efforts undertaken on the nesting grounds. Increased effort in non-breeding areas may also be justified since the majority of the annual cycle occurs in these habitats; therefore their significance cannot be ignored.

In contrast to counts of Eastern Canada plovers (*melodus*), counts of Prairie Canada birds (*circumcinctus*) have seen a +19% increase in its count since 1991 (Table 1; Figure 2). Alberta's numbers increased the most (+52%), followed by Saskatchewan (+21%). Manitoba was the only

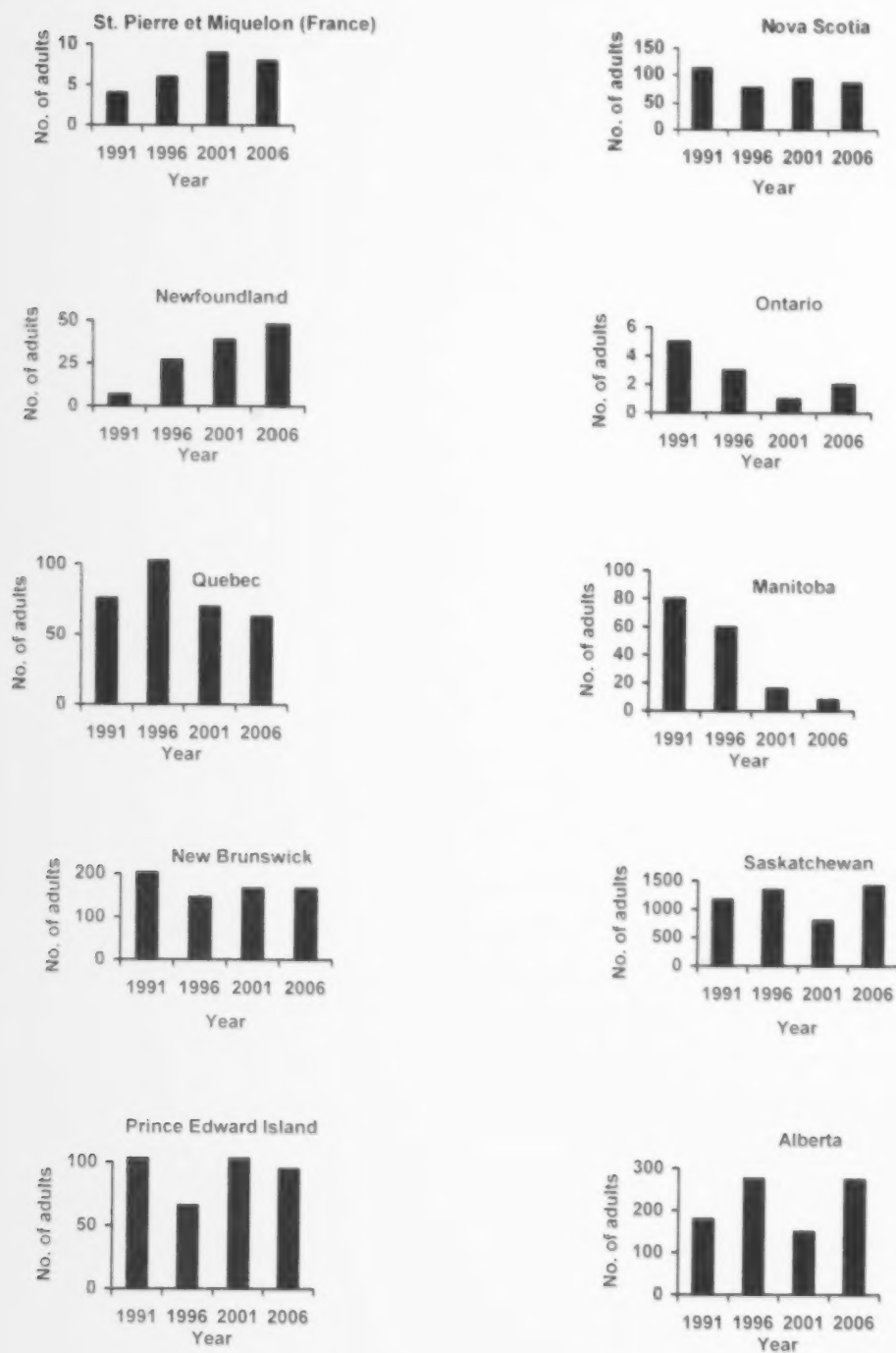


Figure 3. Counts of Piping Plovers in nine Canadian provinces and St. Pierre et Miquelon (France), 1991-2006. (Data from Amirault 2005, Haig et al. 2005 and this report).

province in Canada where plover counts were lower in every international census following the first census in 1991. High water conditions during most of the censuses and habitat loss through vegetation encroachment and structural changes have greatly reduced Manitoba's usual Piping Plover breeding habitats. Both Ontario and Manitoba had the greatest decrease in numbers since 1991, -80% and -90% respectively. In 2006, all of Manitoba's known population bred on artificial sites (parking lots) at Grand Beach Provincial Park. It was only through intensive management that exceptional productivity was realized at Grand Beach Provincial Park in 2006. The discovery of a small population at Lake of the Prairies in western Manitoba in 2004 and 2005 (D. Hatch, pers. comm.), may boost Manitoba's provincial population, however, the habitat security at this site is in question because of a proposal to increase water levels at this reservoir. No surveys were conducted at Lake of the Prairies in 2006, so this Piping Plover population's status was unknown during the last census. Ontario's Lake of the Woods' Piping Plovers, like Manitoba's, were also near extirpation. Nesting has not been documented on the Canadian side of this lake since 2002 (L. Heyens, pers. comm.) and only one to two adults are seen annually. Most habitats in the U.S. portion of the lake have been decimated and numbers have dropped from 47-50 Piping Plovers in 1984 (Minnesota Department of Natural Resources 1999) to four in 2006 (K. Haws, pers. comm.).

Few Piping Plovers are seen in the Canadian Great Lakes region and international census counts average about one plover (Table 1). As of 2006, Piping Plovers were still an extirpated breeding species in southern Ontario with nesting last recorded in 1977 (Lambert 1987). The NGP count trend during the first three censuses was downward, declining by -15% (Haig et al. 2005). Unexpectedly, the census results from the 2006 survey showed a sharp increase in plover numbers. The overall NGP count, 4662 adults (Elliott-Smith et al. 2009), appears to have increased by approximately +58% since 2001. In Prairie Canada alone, the count was up by +75% from 2001 with the greatest percent increase seen in Alberta (Table 1). The increase may be inflated given that 2001 was the lowest count on record for Prairie Canada. It is interesting to note that population estimates reported for the 1991 (1437 adults), 1996 (1687 adults) and 2006 (1703 adults) censuses are relatively close. The 2001 population estimate (972 adults) reported may therefore have been an anomaly, with lower than normal abundance. The results reported in 2006 may in reality reflect a return to normal population abundance. Future census efforts will be needed to understand the long-term population trends and factors that may be contributing to low and peak abundance levels.

The high Piping Plover count in 2006, however, is good news for recovery managers. But the question remains, why was there such a great increase in numbers? There are several possible explanations. The first one is that there was a real increase in the populations because of increased natural productivity. Historically, however, natural fledging rates in the NGP have been estimated at just under one chick per pair; below the 1.25 chicks per pair thought to be required to sustain the



population (Larson et al. 2002). This suggests that natural productivity may not have contributed significantly enough to account for the higher count in 2006. It is doubtful that adult and juvenile survival would have changed significantly between the last two censuses to account for the increase.

Population redistribution between Canada and the United States is a less plausible explanation. Recent population studies in the NGP suggest that there is very little movement of plovers between Canada and the United States. These data do not support the hypothesis that broad population shifts occur in the NGP when habitat suitability changes (Amirault 2005; Haig et al. 2005).

Recovery efforts in the past ten years have been quite extensive within the NGP (Plissner and Haig 2000, Goossen et al. 2002, Murphy et al. 2003, United States Fish and Wildlife Service 2003, Haig et al. 2005, Jacobson 2005, Schmelzeisen et al. 2005, White 2005, Miller 2006). It is possible that those efforts are now resulting in positive population trends. If this explanation is valid, it would match the U.S. Atlantic's opinion that its population is being sustained primarily through management (United States Fish and Wildlife Service 1996). In contrast, intensive management in Canada's eastern provinces, where the majority of the population is actively managed, has not experienced an overall increase in its population.

A potential explanation for the difference in the 2001 and 2006 counts is that of periodic population fluctuations and the timing of censuses. The 2006 count may have occurred during a peak in population growth; alternatively a conservative count may have been the result of conducting a census during a low in the population. Given that counts are only made every five years and the current sample size is limited to four censuses, there could be a considerable amount of variation in intervening years and stochasticity could be playing a role in the outcome of censuses.

Another explanation for the increased numbers in 2006 is that detectability of plovers may have changed. One would have to assume that detectability actually increased in order to explain the high count. Over time, as observers become more familiar with the Piping Plover and its habitat, improvement in detection rates should be expected. Improved detection rates by experienced observers, however, should be offset somewhat by novice or inexperienced observers and reduce the likelihood of an exceptional count.

The explanation for the highest count in 2006 for the Northern Great Plains population is unresolved and may be a combination of factors mentioned above. Future censuses will hopefully show more reliable trends and counts taken at sites in the intervening years may aid in interpreting international census results. Assessing detectability during future censuses should also aid assessing population counts and trends.



Factors affecting the two Canadian populations appear to be unrelated, as trends in numbers are not consistent between the two subspecies. This further suggests that any population trend that may exist between the two subspecies acts independently. Census results support this observation because the two highest counts in Prairie Canada coincide with the two lowest counts in eastern Canada.

### **Recovery conservation in Canada**

Piping Plover recovery conservation has been ongoing for about 20 years in nine Canadian provinces. National recovery planning during this period was facilitated by two recovery teams and the completion of three recovery plans (Atlantic and Prairie Piping Plover Recovery Teams 1989, Goossen et al. 2002, Environment Canada 2006). During this period, new legislation was passed provincially and federally to aid species at risk like the Piping Plover. Most notably was the federal *Species at Risk Act* which was passed in 2002. This Act resulted in the reconstruction of recovery plans, now called recovery strategies and enabled regional action-oriented plans to be developed. The formation of Recovery Implementation Groups also helped provincial recovery planning. Funding programs such as the federal Habitat Stewardship Program fund have aided guardian programs in the Prairie Provinces and eastern Canada. The Endangered Species Recovery Fund has also supported important conservation efforts.

The primary tool used to protect Piping Plover clutches and newly hatched young is the predator enclosure. Although, enclosures have been shown to enhance the likelihood of successful nesting, their use remains limited because of the need for frequent monitoring. Current resources do not allow widespread use of predator enclosures as a management technique. Guardian programs are active in both eastern and western Canada and serve to not only protect plover nesting efforts but play an important role in educating the public about the Piping Plover.

A new responsibility for species at risk recovery managers in Canada is the requirement under the *Species at Risk Act* to identify critical habitat. The recovery strategy for the *circumcinctus* subspecies of the Piping Plover outlined criteria to identify basins that may contain critical habitat and indicated that critical habitat would be listed in provincial action plans (Environment Canada 2006). A comparable recovery strategy for the eastern Canadian subspecies (*melodus*) has been developed. It summarizes threats to the species, identifies recovery goals and critical habitat, and recommends a general conservation approach to Piping Plover recovery. Because recovery goals have not yet been achieved in eastern Canada, all sites with suitable habitat, occupied by at least one nesting pair of Piping Plovers in at least one year since 1991 (the year of the first international census, and therefore comprehensive survey of all regional sites) would be considered critical habitat. Protection of critical habitat on federally owned properties will be achieved through federal

initiatives. Elsewhere protection will be pursued under provisions of provincial legislation and promotion of landowner/lessee stewardship. Identification of critical habitat will help pinpoint areas where management efforts need to be focused. Management of these areas essential for the survival and recovery of the species will need to include the implementation of complementary land use practices or mitigative measures wherever feasible and techniques to counteract the negative impact of predation pressure.

Although four international censuses have now been completed and many recovery practitioners have been involved for some time in recovery efforts for the species, it is too early to confirm overall population trends for either Canadian population. It is evident, however that management efforts will need to continue in the foreseeable future in order to secure the future of the species in Canada.

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APPENDIX

## APPENDIX 1

Census methodology and forms (Source: <http://fresc.usgs.gov/products/ppl/assessb06.doc>)

### 2006 INTERNATIONAL PIPING PLOVER BREEDING CENSUS Guidelines

**General Purpose and History:** The International Piping Plover Census, as designated by the International Piping Plover Coordination Group, has been established to provide a complete census of all Piping Plover populations on both wintering and breeding grounds every five years. The 2006 census is the fourth to be carried out over the past 15 years. The primary function of the breeding census is to gather data for monitoring moderate-to-long-term population trends and will to assess success of recovery efforts in meeting recovery objectives. Census data also provide information on the species' range and use of local habitat and may help elucidate migratory patterns. The first International Census, conducted in 1991, provided a population benchmark for the species status and distribution in North America. The breeding census included the efforts of hundreds of individuals in 22 U.S. states, nine Canadian provinces, and the French territory of St. Pierre and Miquelon. During the census period, 5,482 adult Piping Plovers (2,441 pairs) were documented. Subsequently, the 1996 census recorded 5,913 individuals (2,668 breeding pairs), an increase of 7.7% from 1991. Overall numbers seen in 2001 were similar to 1996 (5,945 individuals), however a greater proportion of birds were recorded on the U.S. Atlantic compared to previous censuses and fewer birds were recorded in the Northern Great Plains/Prairie region. The 2006 International Census will complement previous surveys, however we will be including a detectability study to better understand the error in our estimates and provide a framework for interpreting population trends over time.

**Census Dates:** Ideally, we would like to have all surveys conducted during the same two week census period across North America, and within a time frame that facilitates comparisons to results obtained in previous surveys. Wherever possible, therefore, we ask that the census be undertaken between **June 3<sup>rd</sup> and June 16<sup>th</sup>, 2006** (except U.S. Atlantic which will be June 1-9). If that is not possible, please contact us to discuss your survey plans. For sites included in the detectability study, see "Detectability Methods" below.

**Coordination:** The 2006 census will be directed from USGS Forest and Rangeland Ecosystem Science Center in Corvallis, Oregon via Susan Haig (541-750-7482, email [susan\\_haig@usgs.gov](mailto:susan_haig@usgs.gov)). Elise Elliott-Smith (541-750-7390, email: [eelliott-smith@usgs.gov](mailto:eelliott-smith@usgs.gov)) will be the primary coordinator for the census. State/Provincial Coordinators will organize census activities within each state/province and may designate local contact persons or coordinate all censusers directly. The responsibilities of each participant are outlined below:

- I. **Census Coordinator:** Susan Haig and other members of the Piping Plover Coordination Group will identify State/Provincial Coordinators and Elise Elliott-Smith will provide them with census report forms, summary sheets, and assessment forms. Maps will not be distributed with the census information, as in previous censuses. It will be up to each state/provincial coordinator to provide site map(s) to surveyors. It is also highly recommended that aerial photograph(s) be provided to each surveyor, if they are available and represent the general appearance and water level at the time of the survey. Susan and Elise will summarize census information and publicize results of both the winter and breeding censuses by Summer 2007. As in previous years, results will be presented in various formats:
  - a technical paper submitted to a scientific journal
  - a detailed report covering each state/province/country for distribution to recovery teams, state/provincial coordinators, and other natural resource agencies
  - GIS-based maps and datasets posted on appropriate websites

- a popular article in a national/international birding magazine
2. **State/Provincial Coordinators:** will identify censusers and areas to be surveyed. They will distribute census materials to individual surveyors directly or through local contact persons. Following the census, they will summarize results, ensure that each site is mapped by latitude and longitude, and review habitat measures for each site. They will also provide a brief assessment of the census in their state/province/region.

Following completion of the census, Coordinators should send to Elise Elliott-Smith:

- All Individual Census Reports, Maps, and Surveyor Experience Forms
- State/Province Summary Sheet
- State/Province Assessment Form
- Detectability Summary Sheet

We ask that this information be forwarded to Elise Elliott-Smith by **August 15<sup>th</sup>, 2006**, and that we be informed of any delays as soon as possible. Maps of census sites should be turned in with the census summary. **Each site should contain reference latitude and longitude coordinates shoreline length, and average width (for suitable habitat).**

3. **Individual Censusers:** will be given a copy of these census guidelines, a surveyor experience form, a habitat definition form, and a census data sheet and map for each site they are to survey. Multiple individuals are encouraged to conduct censuses together. At least one individual surveying each site should be experienced in identification of shorebirds. Whenever possible, censuses of each site should be completed during one day. Census data forms should be filled out as completely as possible for all surveys at each site and returned to the state/provincial coordinator by the specified date. Maps should also be returned to the coordinator with the census area clearly circled and labeled, **including latitude and longitude** of approximate site center. Specific locations where Piping Plovers are observed should also be indicated on maps. **Census reports and maps should be returned even if no Piping Plovers were observed.**

**Impetus for and Discussion of Detectability Study:** During every census we try to survey all known and potential sites to obtain as complete a count of birds as possible. However, we know that it is highly unlikely that we will count every single Piping Plover during the census. Despite thorough coverage, a single survey of a site is unlikely to detect 100% of Piping Plovers at that site. This is in part due to the small cryptic nature of the Piping Plover and the difficulty of covering some survey sites, but detectability is a problem often encountered with wildlife species when trying to estimate abundance, density, or occupancy.

Multiple methods have been developed in recent years to address errors in detectability and incorporation of detectability measures is now prevalent in wildlife studies aimed at obtaining abundance and density estimates. Susan and Elise have considered various methods for assessing detectability such as distance sampling, double-observer methods, and double-sampling. We have consulted statisticians at Patuxent Wildlife Research Center (Jim Lyons and Andrew Royle) and many biologists currently involved in Piping Plover research, and have decided to assess detectability using a modified double-sampling approach. We will survey a subset of sites twice and analyze the survey data using binomial mixture models (please contact us for more information).

Since winter census numbers are always much lower than for the breeding census, we decided to focus our efforts on assessing detectability at the breeding grounds. Due to habitat differences across the range, we are using a stratified random sampling approach to select sites for participation in the detectability

study. Sites were first stratified by population (East Coast, Great Lakes, and Prairie/Plains). Since there are a variety of habitats in the Northern Great Plains/Prairies, and since detectability is likely lowest in this region, we further stratified survey sites into one of three categories (river habitat, reservoirs, and alkali lakes) prior to sub-sampling. Within each region or habitat type, a subset of sites are chosen randomly so that detectability results can be applied to the remaining sites.

Census Methods: In general, census methods will be very similar to previous censuses, but some additional efforts will be made to standardize collection of data, a little additional data will be collected, and sites selected for the detectability study will be surveyed twice.

- 1. General Census Methods:** All known and potential Piping Plover breeding sites will be surveyed once within the census window and surveyors should answer all questions on our data form as completely as possible for each site surveyed. Sites may include individual wetlands, lakes, or stretches of river or coastline or any portion of the above. Most sites will be surveyed by foot, but some may be surveyed by boat or other means. The primary purpose of each survey should be to count birds. If surveyors must participate in additional activities at a site (putting up fencing or exclosures, nest searching, etc), please conduct these activities after the survey is completed.

The goal of the census is to count both breeding pairs and unpaired adults. Pairs should only include two birds actually seen together. Single birds in the presence of nests/young or engaged in territorial displays should be tallied separately from other unpaired birds. Although we ask that the number of nests/broods be reported at regularly monitored sites, we discourage surveyors from searching for nests in order to minimize disturbance to breeding sites and focus energies on obtaining the best possible count of adults. We are specifically not addressing issues of reproductive success during this census. In the event that the survey is interrupted for any reason, please note the time spent engaged non-survey activity so that this may later be subtracted from the overall time spent surveying.

At each site, surveyor(s) should cover all suitable Piping Plover habitat as thoroughly as possible (including areas that appear to have habitat but where birds have not been recently seen). In wide areas (especially flats used for feeding), surveyor(s) may need to zig-zag through the habitat to ensure thorough coverage. However, avoid encroaching on nesting territories when possible and in all cases limit time spent in any single territory to no more than 5 minutes. Care should be taken to note where birds have flown to and from in order to avoid double counting. If surveyor(s) retraces steps to return to the access point, they should only record additional birds if it is certain they were not previously counted. Avoid conducting surveys during extreme weather conditions, which not only compromises detection, but also increases risks of disturbance to the birds. Please try to conduct during early morning hours or high tide since plovers are likely more detectable at this time.

During the survey, information should be entered on the census data sheet and map(s)/aerial photo(s). All questions and blanks on data sheet should be filled in or answered while at the site. Please review the Habitat Definitions sheet, so that you can accurately answer questions about habitat at the survey site. Area of habitat surveyed should be estimated and marked on the map. Record the approximate length and average width of the strip of suitable habitat surveyed (this includes all potential areas a Piping Plover could use for foraging or nesting); if the site is particularly large or convoluted, please make a note in the comments section of the data form. On your map, delineate the boundaries of habitat by drawing and labeling a closed form on the map or aerial photograph that closely resembles the size and shape of the area surveyed. Mark the location of all Piping Plovers seen during the census with a number on the map (1, 2, 3...) representing the order in which the bird was seen. If birds move within their territory during the survey or if surveyors have prior knowledge of territory



boundaries, this should be indicated by drawing circles around the numbered birds on the map. Indicate with an arrow the direction and location birds are going if they fly off or appear to leave their territory during the survey. **Please try to minimize disturbance to the birds!**

2. **Detectability Methods:** Census coordinators will notify surveyors if they are surveying sites selected for inclusion in the detectability study. These sites should be surveyed twice following the same general methods as above and results recorded on two separate data forms. Larger sites have been broken down into smaller sites for the purpose of the detectability study, so that they will not need to be re-sampled in their entirety. At sites that will be surveyed twice, it is extremely important that the same exact area be covered on both surveys. At least one survey of each site should be conducted during the census window but a second survey may be conducted either before or after the census period if necessary (except U.S. Atlantic where surveyors should submit data from every survey of the site conducted within their window). Two surveys of a site should be conducted on different days, but within a 10 day period. Whenever possible, the same surveyor(s) should conduct both surveys. If a site selected for inclusion in the detectability study can not be re-surveyed, please contact us. Since the detectability study assumes a closed population, it is very important for surveyors to record any factor that may have caused permanent movement of birds into or out of a site (i.e. a severe weather event or flooding has occurred); please explain thoroughly on the second data form recorded for that site.

Additional data thought to affect detectability will be collected in conjunction with all surveys and recorded on the data sheet and maps. Surveyors will be asked to rank their experience in identifying Piping Plovers and their experience with the specific site being surveyed on the surveyor experience form. More precise information about time spent surveying and area of habitat covered will be recorded on the data sheet since these may provide a measure of effort. Habitat factors that could affect detectability such as vegetation cover and complexity will also be recorded. Mapping locations of birds seen (see above) will also help us refine our detectability estimate. This additional information will be entered into our mixed models during analysis.

General Site Selection: Ideally, all habitat recently and/or currently suitable for Piping Plovers should be surveyed in 2006. Due to lack of information about sites or other constraints, however, this goal may not be achievable in some states/provinces. To meet census objectives, we therefore suggest the following priorities: 1) Sites that had Piping Plovers present in 1991, 1996, 2001 or later. 2) Sites that had suitable Piping Plover habitat in 1991, 1996, and 2001. 3) Sites that were unsuitable when censused in 2001 but that have been suitable more recently. 4) Sites not censused in 2001 but are likely to contain suitable Piping Plover habitat. 5) Sites not censused in 2001 but with historic records of use by Piping Plovers. To most accurately analyze population trends over the past fifteen years, at least the first three priorities need to be met.

**We thank you for your involvement with the 2006 International Piping Plover Census!  
Each census is extremely important in allowing us to monitor recovery efforts for this  
species.**



(Editorial note: Formatting of the Individual Census Report may differ in places from original.)

## 2006 INTERNATIONAL PIPING PLOVER BREEDING CENSUS

### Individual Census Report

Please complete this form as thoroughly as possible for each location surveyed, even if Piping Plovers are not found. Attach a map, **with the habitat surveyed clearly marked in addition to the locations of all plovers**. Also feel free to attach additional comments. These forms should be sent to your State/Provincial Coordinator by **July 15, 2006**. For further information, contact your State/Provincial Coordinator or Elise Elliott-Smith, USGS Forest and Rangeland Ecosystem Science Center, 3200 SW Jefferson Way, Corvallis, OR 97331 USA; 541-750-7390; eelliott-smith@usgs.gov; FAX 541-758-8806.

1. Total # of pairs of Piping Plovers seen: \_\_\_\_\_  
Pair criteria used (check all that apply):  
Courtship behavior \_\_\_\_\_ Pair at nest \_\_\_\_\_ Birds located together \_\_\_\_\_  
Joint defensive behavior \_\_\_\_\_ Pair with young \_\_\_\_\_  
Other (describe) \_\_\_\_\_
2. Total # of single adults seen: \_\_\_\_\_  
# with nest/young: \_\_\_\_\_ # engaged in territorial display (but no nest/young): \_\_\_\_\_  
# non-territorial \_\_\_\_\_
3. If reproductive monitoring occurs at this site:  
Total # of active nests: \_\_\_\_\_  
Total # of active nests recorded on the previous visit: \_\_\_\_\_
4. Census Location:  
Local name of site: \_\_\_\_\_  
County: \_\_\_\_\_ State/Province: \_\_\_\_\_  
Latitude: \_\_ deg \_\_ min \_\_ sec Longitude: \_\_ deg \_\_ min \_\_ sec  
(approx. center of site)  
River Miles (Missouri, Niobrara, and Platte Rivers only): \_\_\_\_\_  
Map(s) (USGS topo quad; atlas/gazetteer grid #; etc.): \_\_\_\_\_  
\_\_\_\_\_  
Land Ownership: Federal \_\_\_\_\_ State/Provincial \_\_\_\_\_ Municipal \_\_\_\_\_  
Private \_\_\_\_\_
5. Date of census: \_\_\_\_\_
6. Time census conducted: \_\_\_\_\_ to \_\_\_\_\_ Was census interrupted (y/n)? \_\_\_\_\_  
Length of interruption: \_\_\_\_\_
7. Will this site be included in the detectability study (y/n)? \_\_\_\_\_  
This is the first/second/additional visit (circle one)

8. Conditions:

Tide stage(s): Low \_\_\_ Mid \_\_\_ High \_\_\_ (Rising \_\_\_ / Falling \_\_\_ )  
 General weather: Sunny \_\_\_ Partly cloudy \_\_\_ Overcast \_\_\_ Rain \_\_\_  
 Fog \_\_\_ Other \_\_\_  
 Approximate temperature: \_\_\_ Celsius/Fahrenheit (circle one)  
 Wind speed: \_\_\_ km/hr miles/hr (circle one)  
 Wind direction: \_\_\_

9. Habitat censused (check as many as apply, **see Habitat Definition sheet**):

Body of Water: **I.** Ocean \_\_\_ **II.** Protected bay, harbor, cove, lagoon, sound \_\_\_  
**III.** River \_\_\_ **IV.** Alkali lake/pond \_\_\_  
**V.** Natural freshwater lake \_\_\_ **VI.** Reservoir \_\_\_  
**VII.** Industrial Pond \_\_\_ **VIII.** Other (describe) \_\_\_\_\_

Shoreline: **A.** Mainland (of coast, lake, river, bay, etc.) \_\_\_  
**B.** Barrier beach \_\_\_ **C.** Barrier Island \_\_\_ **D.** Protected shore \_\_\_  
**E.** Spoil island \_\_\_ **F.** River bar \_\_\_ **G.** Other island \_\_\_  
**H.** Dry lake bed \_\_\_ **I.** Other (describe) \_\_\_\_\_

Substrate(s): **1.** Sand beach \_\_\_ **2.** Sand spit \_\_\_ **3.** Sand dune \_\_\_  
**4.** Overwash/overwash fan \_\_\_  
**5.** Blow-out/Hollow/Swale \_\_\_ **6.** Sand bar \_\_\_ **7.** Silt \_\_\_  
**8.** Gravel shore \_\_\_ **9.** Gravel bar \_\_\_ **10.** Gravel pit \_\_\_  
**11.** Alkali mudflat \_\_\_ **12.** Coastal mudflat \_\_\_  
**13.** Vegetated shoreline (see below) \_\_\_ **14.** Vegetated bar (see below) \_\_\_  
**15.** Vegetated flats (see below) \_\_\_ **16.** Other (describe) \_\_\_\_\_

10. What percent of suitable potential Piping Plover habitat at this site is vegetated\*? \_\_\_  
 \* **definition for vegetated habitat:** sparse, short vegetation that could be used by plovers, but could potentially impede surveyor visibility. Do not consider non-habitat (where there is dense vegetation). Also, do not classify habitat as "vegetated" if growth is extremely sparse, or dense but very short (no taller than belly high on a plover).

11. Habitat(s) where Piping Plovers found (for each bird seen use above designations; e.g., IIC8, IIIB9):

**MARK LOCATION OF EVERY BIRD SEEN ON MAP PROVIDED**

12. Mode(s) of transportation: Foot \_\_\_ Car/Truck \_\_\_ ATV \_\_\_ Boat \_\_\_ Airboat \_\_\_  
 Other \_\_\_\_\_

13. Linear Habitat (shoreline) covered: \_\_\_\_\_ km/miles (circle one)  
 Average width of habitat: \_\_\_\_\_ m/ft.

**DRAW A LINE AROUND ALL HABITAT SURVEYED ON MAP PROVIDED**

Was census completed for this area? yes \_\_\_ no \_\_\_

What percentage was missed? \_\_\_\_\_

What areas were missed? \_\_\_\_\_

14. Was site censused in 2001? Yes \_\_\_\_\_ No \_\_\_\_\_

Was site censused in 1996? Yes \_\_\_\_\_ No \_\_\_\_\_

Was site censused in 1991? Yes \_\_\_\_\_ No \_\_\_\_\_

If "yes," how does coverage differ from earlier surveys? \_\_\_\_\_

15. Were there any circumstances that may have affected census results (weather conditions, human disturbance, etc.)? \_\_\_\_\_

16. Band combinations of any marked birds (right leg:left leg from top to bottom: note colors, flags or bands, etc.)

Number on Map

Band Combination

Number on Map

Band Combination

_____	_____		_____
_____	_____		_____
_____	_____		_____

17. Describe any apparent injuries of banded or unbanded birds. \_\_\_\_\_

18. Number of people censusing: \_\_\_\_\_

Censusers names, affiliations, phone numbers, email: (attach additional list if necessary)

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

19. Additional information/comments: \_\_\_\_\_

20. Return form and maps to: **State/Provincial Coordinator:**

**Address:** \_\_\_\_\_

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2006 INTERNATIONAL PIPING PLOVER BREEDING CENSUS  
Surveyor Experience Form

Please distribute this form to all surveyors that participate in the Census. One form should be filled out for every surveyor. Please return form to your provincial/state coordinator. Any questions may be directed to Elise Elliott-Smith, USGS Forest and Rangeland Ecosystem Science Center, 3200 SW Jefferson Way, Corvallis, OR 97331 USA; 541-750-7390; celliott-smith@usgs.gov; FAX 541-758-8806.

1. Name: \_\_\_\_\_ affiliation: \_\_\_\_\_ phone: \_\_\_\_\_  
email: \_\_\_\_\_

2. Please check the box that most accurately reflects your experience and skill in identifying Piping Plovers

☐ I have been surveying Piping Plovers throughout the breeding season for more than 3 years. I can identify birds from a distance, and am qualified to train others in plover identification and survey techniques.

☐ This is my second or third year surveying Piping Plovers throughout the season. **or** I have surveyed Piping Plovers intermittently but have participated in at least 20 official surveys or research trips that involved Piping Plover identification. I am very comfortable identifying Piping Plovers and when surveying with others I rarely have birds pointed out that I might otherwise miss.

☐ This is my first season surveying Piping Plovers, but I have received training in the field on how to identify Piping Plovers and conduct surveys. I have participated in at least five training or research field trips where I observed Piping Plovers.

☐ This is my first season surveying Piping Plovers, and I have observed Piping Plovers on less than five training or research field trips. However, I consider myself an excellent birder and have watched Piping Plovers for fun on many occasions.

☐ This is my first season surveying Piping Plovers, and I have observed Piping Plovers on less than five training or research field trips.

3. For each site and date you survey please rank your experience with the site in one of the following categories:

I. I have been to this site more than five times prior to this survey. I know the general territory boundaries of all pairs and have located nests.

II. I have been to this site two to five times prior to this survey. I know the general territory boundaries of some pairs and have also located nests.

III. I have been to this site once prior to this survey. However, I am working with others that have taken notes on locations of birds and nests. Therefore, I know the general territory boundaries of all pairs and have knowledge of nest locations.

IV. I have been to this site once prior to this survey and only have a general idea about where birds are, **or** this is my first visit to this site but I have received information about pair and/or nest locations from others.

V. This is my first visit to this site and I have no knowledge of where Piping Plovers are located this year.

Site Name

Date Visited

Experience Rank (I-V)


[illegible]

If your experience with a site or in identifying birds does not match any of the categories above please explain:

This image shows a single page of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page, leaving small margins at the top and bottom. There is no handwriting or other markings on the paper.

## 2006 INTERNATIONAL PIPING PLOVER BREEDING CENSUS

### Habitat Definitions

This list of definitions is meant as a companion to the data sheet. It should be consulted if surveyor is uncertain of the type of habitat they are surveying or how to characterize the habitat where Piping Plovers are sighted. Remember that at many sites, multiple types of habitat are present and all applicable categories should be checked on the data sheet. However, do not mark categories that relate vaguely to the site but do not characterize the Piping Plover habitat at that site. Please be sure to note definitions for vegetated habitat (13, 14, 15).

#### Body of Water:

- I. Ocean – some or all of this site is bordered by the open ocean.
- II. Protected bay, harbor, cove, lagoon, sound – some or of this site is adjacent to a protected body of water. This  
body of water will be sheltered by some type of land barrier and will therefore be calmer than the nearby larger body of  
water (Atlantic Ocean, or Great Lake)
- III. River – any large flowing body of water.
- IV. Alkali lake/pond – permanent, semi-permanent, or ephemeral basin in which the pH is greater than 7.4. Common in the  
Prairie/Pothole region.
- V. Natural freshwater lake – naturally formed basin filled with fresh water (pH < 7.4).
- VI. Reservoir – man-made impoundment. Usually created by the damming of a river.
- VII. Industrial Pond – man-made basin created by dredging.
- VIII. Other – you describe.

#### Shoreline:

- A. Mainland (of coast, lake, river, etc.) – unprotected shore along the continent. This shoreline is usually linear.
- B. Barrier beach – any type of outer shoreline that consists of dunes backed by a smaller protected body of water (but  
connected to the mainland).
- C. Barrier island – an isolated ridge of sand that runs parallel to the main coast but is separated from it by a bay, lagoon, etc.
- D. Protected shore – protected shoreline of a bay, sound, lagoon, harbor, salt pond, ephemeral pool, etc (on either the mainland or an island).
- E. Spoil island – isolated land mass created by dredging activity.
- F. River bar – isolated land mass naturally formed in a river channel.
- G. Other island – you describe.
- H. Dry lake bed – ephemeral basin that has no water at this time.
- I. Other – you describe.

#### Substrate(s):

- 1. Sand beach – linear stretch of sandy habitat on any body of water.
- 2. Sand spit – deposition of sand projecting out from the mainland.
- 3. Sand dune – hill or ridge of sand, formed by the wind, between the water body and upland habitat or protected bay/sound.
- 4. Overwash/Overwash Fan -- area of sand/moist soil formed when ocean storm waves breach the dune and deposit sand in  
fan-shaped flat.



5. Blow-out/Hollow/Swale – unvegetated, sandy bowl or trough between primary and secondary dune (if present), or  
adjacent to primary backdune
6. Sand bar – narrow strip of sand in body of water
7. Silt – any type of formation (bar, beach, flats) where particle size is smaller than sand but larger than clay.
8. Gravel shore – any beach where particle size is larger than sand.
9. Gravel bar – narrow strip of gravel in body of water.
10. Gravel pit – basin of gravel (man-made)
11. Alkali mudflat – wide muddy area bordering an alkali lake.
12. Coastal mudflat – wide muddy area adjacent to the ocean, bay, lagoon, etc.
13. Vegetated shoreline – vegetated shoreline on any body of water. **Only mark this category if you consider this shoreline potential Piping Plover habitat.** Vegetation should be short and sparse enough to be used by Piping Plovers,  
but dense and long enough to potentially impede surveyor visibility.
14. Vegetated bar – vegetated strip of habitat. **Only mark this category if you consider this shoreline potential Piping Plover habitat.** Vegetation should be short and sparse enough to be used by Piping Plovers,  
but dense and long enough to potentially impede surveyor visibility.
15. Vegetated flats – broad flat area covered with vegetation. **Only mark this category if you consider this shoreline potential Piping Plover habitat.** Vegetation should be short and sparse enough to be used by Piping Plovers, but dense  
and long enough to potentially impede surveyor visibility.
16. Other – you describe.



2006 Piping Plover Census

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<sup>b</sup> Name of quad map or number assigned to site on general map of state/region

<sup>c</sup> Mark this box with a star for sites included in the detectability study and report results on detectability summary sheet.

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**2006 INTERNATIONAL PIPING PLOVER BREEDING CENSUS  
DETECTABILITY STUDY SUMMARY****PROVINCE/STATE:** \_\_\_\_\_**COORDINATOR:** \_\_\_\_\_

Please use this form to summarize data collected at sites included in the detectability study.

Were you able to conduct two surveys at all of the sites in your province/state that were randomly selected for inclusion in the detectability study? Please list sites not surveyed and provide an explanation below or on a separate sheet.

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One of the assumptions of the detectability study is that the population of nesting birds in an area remains the same for both the initial and follow up surveys. Please identify the sites and explain any situations where you think this assumption may not be valid (i.e., flooding after the first survey caused catastrophic nest failure). Attach sheet if necessary.

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Was the detectability study a great burden to coordinate and implement? What might reduce this burden in the future? Please explain and provide any additional comments and/or suggestions below or on a separate sheet.

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<b>SITE NAME</b>	<b>FIRST SURVEY DATE</b>	<b># PIPING PLOVERS</b>	<b>SECOND SURVEY DATE<sup>a</sup></b>	<b># PIPING PLOVERS</b>

## 2006 Piping Plover Census

[illegible]

<sup>a</sup> If more than two surveys were conducted at this site during the census period (as may be the case for some sites in the US)

Atlantic), please add additional columns to this sheet or summarize on a separate sheet. Thank you!

PROVINCE/STATE: \_\_\_\_\_

**COORDINATOR:** \_\_\_\_\_

[illegible]

## 2006 Piping Plover Census

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<sup>a</sup> If more than two surveys were conducted at this site during the census period (as may be the case for some sites in the US

Atlantic), please add additional columns to this sheet or summarize on a separate sheet. Thank you!

**2006 INTERNATIONAL PIPING PLOVER BREEDING CENSUS**  
**Province/State Assessment of Census**

This form is to be submitted with the summary sheet and detectability summary after compiling breeding census data. If any data forms have been submitted directly to the Census Coordinator (Elise Elliott-Smith), a summary of the data will be provided so that you can complete this assessment. Please contact me if you need results from previous censuses in your state/province. I can also provide a copy of the 2001 assessment for your province/state.

In your census assessment please try to address the following:

- Extent of known Piping Plover sites and known suitable habitat that was censused
- Areas that were missed, and what areas should be considered for future surveys
- How census numbers compare with previous census results
- Do you believe the results adequately represent the actual population in your state/province? Why or why not?
- What factors are most important in affecting Piping Plover numbers in your region?
- Additional pertinent comments

You may use this form and/or additional pages for your comments. Please make comments about the detectability study on the detectability summary sheet. This assessment will be edited and included in the final census report.

Please return your assessment to: Elise Elliott-Smith, USGS Forest and Rangeland Ecosystem Science Center,

3200 SW Jefferson Way, Corvallis, OR 97331 USA, (541) 750-7390, FAX: (541) 758-8806, [elliott-smith@usgs.gov](mailto:elliott-smith@usgs.gov)

**Email is the preferred method of transfer.**



